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National Conference on Rural Health

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Trends in Illness and Mortality



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Increasing emphasis is being placed on health centers as important elements in both urban and rural public health administration. They provide a focal point for basic services in the midst of the community being served. These are three of the 122 health centers already built with the aid of the Hospital Survey and Construction Act. Under construction or approved for construction are 147 others.



*Attala County Health Center
Carthage, Mississippi*



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Recent Trends in Meningococcal Disease

By ARTHUR W. HEDRICH, Sc.D

The incidence and mortality of meningococcal disease have been slowly rising after a 5-year decline from the 1943-44 epidemic.

Another trend observed in the civilian population is the appreciable rise in the apparent case fatality. Since modern therapy should have reduced the ratio of deaths to recorded cases, indications are that case reporting has deteriorated in recent years.

Data are given here to support these observations, to aid in gauging epidemic potential, and particularly to indicate population segments which appear to be at especial risk.

General Epidemiological Characteristics

The term "meningococcal disease," used at times in this report, includes various clinical forms of the infection, such as meningitis, meningococcemia, and milder forms of invasion.

Bacteriological Types

The bacteriology of the meningococcus is complex, and classifications and viewpoints have changed considerably. The many different strains of the organism are now commonly classed into three major groups. Type I apparently predominates during heavy epidemics, and types II and IIA, endemically (3a, 16). This raises the question whether publication of current national summaries of types found in

State and local diagnostic laboratories might be of value to epidemiologists during the present rising phase of the disease.

Perry (15) advises that in Maryland too few specimens are offered nowadays for diagnostic purposes. However, all of the 14 positives received from 1942-46 (including the epidemic) were type I; of the 7 positives received subsequently (1947-51), only 1 was type I; 3 were type II, and 3 were type IIA.

Clinical Types and Carriers

Three clinical stages of the disease are: (a) nasopharyngeal infection, which is normally asymptomatic and extremely difficult to detect; (b) invasion of the blood stream (septicemia); and (c) meningitis. The nasopharyngeal infections, although unquestionably the major source of new cases, are rarely recorded. Practically all of the reported cases are septicemias and meningitis.

Nasopharyngeal infections are extremely common during epidemics. In Army camps, prevalence of asymptomatic carriers may run from 30 to 50 percent or more of the strength (2, 3, 6); and even in civilian communities prevalence of meningococcal carriers has been found to be as high as 30 percent. This means that meningococcal infection during epidemics may be about as prevalent as the common cold. Hence, it has been said that "the recognized cases constitute merely the visible foam on top of a huge carrier wave" (6). Even during endemic periods in the civilian population, meningococci may be found in the rhinopharynx in about 2 percent of the healthy persons.

It has been estimated that possibly as few as 1 per 1,000 subclinical infections develop into

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frank cases with septicemia or meningitis (1, 7b).

Fulminating Cases

Although the sulfa drugs and antibiotics have been effective therapeutic agents, the following recent incidents among others (3, 14) illustrate the problem of obtaining prompt diagnosis and treatment in fulminating cases.

1. Dr. A. L. Gray, Mississippi State Board of Health, recently reported (12a) four deaths from meningococcal disease within about a month among Negroes in a rural neighborhood. Duration of illness was 8 to 16 hours. One death certificate gave "bronchial pneumonia" as the cause of death, but on autopsy this was changed to meningococcal septicemia. A second death certificate reported "no doctor."

2. Dr. James Strain advises the writer that during his 2-year residency in Cleveland hospitals in 1948-49, some 8 to 10 children with previous diagnoses of measles, then heavily prevalent in the city, arrived at the emergency wards in moribund condition or dead. Post-mortem blood cultures in these cases revealed meningococci.

Age, Race, and Sex

The reported case rate for infants is four or more times higher than for school children and adults (table 1 and fig. 1). In measles the opposite is true, the attack rate at ages 6 and 7 being fully four times higher than in infancy (8).

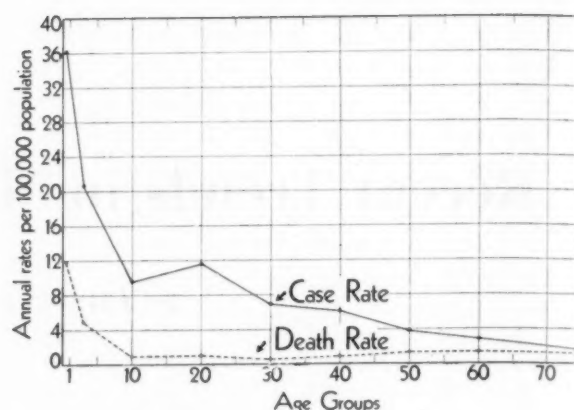


Figure 1. Reported case and death rates for meningococcal meningitis by age, Maryland 1940-49.

Obviously, some form of immunity to effective meningococcal invasion is commonly developed early in life.

At ages 15-24, the hump seen in the case rate curve of figure 1 is probably attributable mainly to the excess of cases reported from Maryland induction camps during World War II. Other data (14), however, indicate that during epidemics the attack rate among adults in Maryland is generally stepped up from 3 to 10 times more sharply than the rate for infants. In other words, although infants are always the most vulnerable group, in epidemic periods adults have the highest increase in reported case rates.

The apparent case fatality (ratio of deaths to reported cases) during a 10-year period is

Table 1. Age distribution of morbidity, mortality, and apparent case fatality for meningococcal meningitis, Maryland 1940-49

Age group (years)	Numbers			Annual rates per 100,000 population		Apparent case fatality ¹ (percent)
	Reported cases	Deaths	Mean population	Reported cases	Deaths	
All ages.....	1, 787	310	2, 082, 622	8. 6	1. 5	17. 3
Under 1.....	160	52	44, 180	36. 2	11. 8	32. 5
1-4.....	317	76	153, 755	20. 6	4. 9	24. 0
5-14.....	320	32	332, 259	9. 6	1. 0	10. 0
15-24.....	393	34	337, 849	11. 6	1. 0	8. 7
25-34.....	250	23	360, 102	6. 9	. 6	9. 2
35-44.....	187	27	306, 917	6. 1	. 9	14. 4
45-54.....	91	32	240, 001	3. 8	1. 3	35. 2
55-64.....	46	18	164, 007	2. 8	1. 3	39. 1
65 and over.....	23	16	143, 552	1. 6	1. 1	69. 6

¹ Apparent case fatality is the ratio of deaths to reported cases.

relatively high in infancy and in late life, and lowest in the second and third decades of life (fig. 2 and table 1).

Data from an unpublished thesis of J. H. Fan (10, 14) indicated that during 1930-41: (a) males had about double the attack rate of females, the excess being slightly greater in Baltimore City than in the counties; and (b) the attack rate among Negroes in Baltimore City was about 3.7 times as high as the rate for white persons. In the counties of Maryland, it was only about 2.1 times as high. The correlation of high attack rates with crowding suggests that congested living conditions may be primarily responsible for the high attack rate among the Negroes.

Role of Population Crowding

It has long been recognized that meningitis spreads most rapidly at times and places of population congestion, where contact rates are high, as in war camps and institutions. Military authorities found in World War I that increasing the space between beds in barracks decreased the meningitis attack rate (6).

In Baltimore City, attack rates in the most crowded areas averaged about seven times the rates in the least crowded during two epidemics (fig. 3 and table 2). In fact, during the 1935-37 epidemic, this ratio of attack rates of crowded/uncrowded was 12.5.

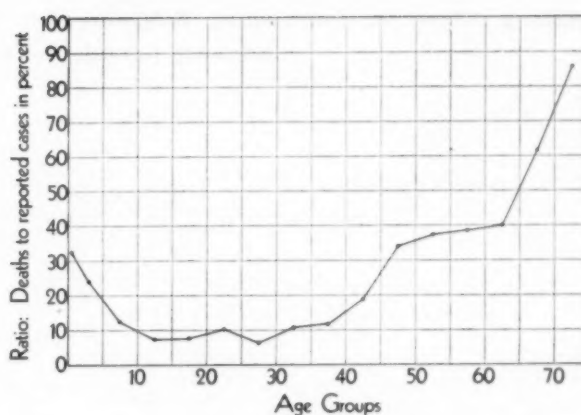


Figure 2. Apparent case fatality for meningococcal meningitis by age, Maryland 1940-49.

Rural areas also showed low rates. In 1942, the latest epidemic year Fan (10) could include in his study, the incidence rate for meningitis was only 5.0 per 100,000 population in the 9 counties with less than 60 persons per square mile, compared with a rate of 12.7 for suburban districts of Baltimore, and 23.1 for "Old Baltimore City" which has 26,000 persons per square mile.

It is important to recognize that in Maryland, at least, the excess risk for the city applied especially to epidemic periods. Table 3 shows that although, during recent epidemic periods, the death rates in Baltimore averaged 2.6 times more than the rates for the rest of Maryland,

Table 2. Relation of population congestion to reported meningococcal meningitis morbidity in Baltimore, Md., 1935-37 and 1941-42 epidemics¹

Percent of overcrowded ¹ dwelling units within area	Number of census tracts	1935-37 epidemic ²			1941-42 epidemic ^{2,3}			Average of case rates of 2 epidemics
		Estimated population July 1, 1936	Number of reported cases	Average annual case rate ⁴	Estimated population Jan. 1, 1942	Number of reported cases	Average annual case rate ⁴	
All areas	155	838,766	572	22.7	899,000	271	15.1	18.9
Under 1	37	156,368	20	4.3	167,596	22	6.6	5.5
1.00-2.49	40	224,868	51	7.6	241,017	49	10.2	8.9
2.50-4.99	39	220,972	155	23.4	236,841	80	16.9	20.1
5.00-7.49	25	150,116	205	45.5	160,896	76	23.6	34.5
Over 7.50	14	86,442	141	54.4	92,650	44	23.7	39.0

¹ "Overcrowded dwelling units" defined as those with more than 1.5 persons per room.

² U. S. census tract data for persons per room in Baltimore dwellings and related meningitis data were obtained by Dr. Fan through the courtesy of Dr. W. Thurber Fales, Department of Health, Baltimore, Md.

³ Dr. Fan was unable to include in his thesis data for 1943, an epidemic year.

⁴ Case rates are per 100,000 population, annual basis.

Table 3. Ratio of death rates, Baltimore City to Maryland counties, during epidemic and low-incidence periods, for meningococcal meningitis

Periods covered	Baltimore City			Maryland counties			Ratio: City rate to counties
	Total population (person- years)	Deaths	Death rate ¹	Total population (person- years)	Deaths	Death rate ¹	
3 epidemic periods-----	7,781,752	375	4.82	8,385,654	156	1.86	2.6
1929-31-----	2,417,558	61	2.52	2,492,171	20	.80	3.2
1935-37-----	2,516,296	187	7.43	2,734,002	70	2.56	2.9
1942-44-----	2,847,898	127	4.46	3,159,481	66	2.09	2.1
3 low-incidence periods--	7,905,591	49	0.62	9,014,986	65	0.72	0.86
1932-34-----	2,467,492	21	.85	2,612,061	20	.77	1.1
1938-40-----	2,565,099	18	.70	2,855,946	16	.56	1.3
1947-49-----	2,873,000	10	.35	3,546,979	29	.82	.4

¹ Death rates are per 100,000 person-years.

during recent low-incidence periods the city rates have averaged only 0.86 as high as the counties. A somewhat similar decline in the city/county ratio of death rates was noted in New York State (11).

Epidemic Cycles

The rise and fall of death rates from meningococcal disease in the United States since 1915 are shown in figure 4. The underlying annual data for the last two decades are shown in table 5; and data for the earlier years are from Gover and Jackson's tabulations of cerebrospinal meningitis (5b). Figure 4 indicates that:

1. Of the four epidemic crests, two came during war periods (1918 and 1942-43) and two came during periods of relatively high industrial activity during peacetime (1929 and 1935-36). In other words, all four epidemics came during periods of high travel rates and movement of population from rural to more congested areas, such as war camps and cities.

2. The inter-epidemic intervals have varied. Two were of 7 years' duration, and one was 12 years. Observations over a longer time (5, 7) indicate that the interval between epidemic peaks, while varying from a few to as many as 20 years, has averaged about 8 years.

3. During the past 36 years, the national epidemic waves have had a marked continuity and

orderliness. When the annual death rate began to rise, the wave continued rather smoothly to its peak with one minor exception (1933). The declines, likewise, tended to proceed systematically from peak to trough of the wave. For

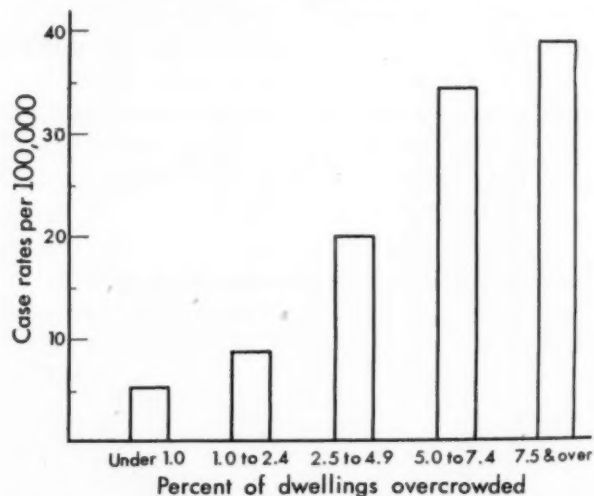


Figure 3. Relation of population congestion to reported meningococcal meningitis morbidity, Baltimore, Md. (epidemic periods 1935-37 and 1941-42).

smaller areas or monthly time intervals, the numbers are smaller and the waves correspondingly less systematic (5a).

Earlier studies (5, 7) have shown that the epidemics in the several regions of the United States tended to synchronize with the national curve, although there were frequent deviations in peaks of a year or two. This geographic

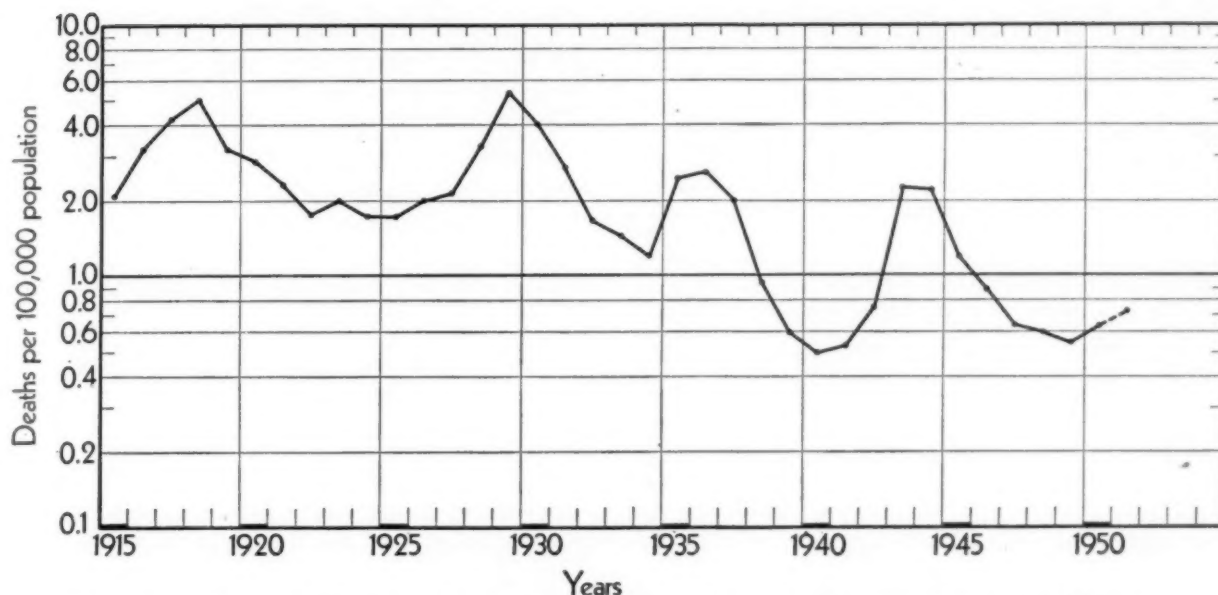


Figure 4. Annual death rates for meningococcal meningitis in the United States, 1915-51.

synchronism has been especially strong during the wartime epidemics, when large numbers of men went to military camps at about the same time. It has further been observed that regions which had very high rates in one epidemic tended to have lower than average rates in the next, and vice versa (7a).

4. In meningococcal disease, the rise to the epidemic peak is more deliberate than for most other communicable diseases, for example, influenza. Examination of regional data for the last 3 epidemics shows that of 27 ascending episodes within regions, the interval from trough to crest was about 3 years in 14 ascents, or slightly more than half. In seven ascents, the duration was about 2 years; in four, it was 4 years; and in two ascents, it was apparently 5 years (5a).

5. The most recent low point in mortality for the United States occurred in 1949; but there has been a rather flat trough during the last 4 years which resembles the wave bottom which terminated the recession from the World War I epidemic wave. The rise following that trough covered fully 4 years: from 1925 to 1929. If history should repeat itself in this regard, several years of increase would lie ahead.

Quarterly Index of Epidemicity Trend

To give a more detailed view of the recent rise and to facilitate projection into 1952, quar-

terly morbidity data are given in figure 5 and table 4. Like most communicable diseases, meningococcal infections show a seasonal cycle in which, from the low in about September to the high point in early spring, cases are multiplied on the average by about four—sometimes more during epidemics (5c). In order to cancel out this seasonal swing and to show an epidemic wave comparable with the annual data, an "epidemicity index" has been calculated for each quarter year. This index is the ratio of reported cases to the median of the corresponding quarters for the 10-year period 1940-49.

Comparison of the epidemicity index (fig. 5)

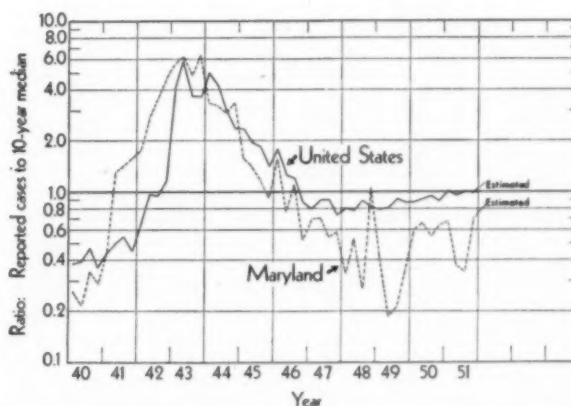


Figure 5. Epidemicity index for meningococcal meningitis (ratio of reported cases to 10-year median) United States and Maryland, quarterly, 1940-51.

Table 4. Quarterly reported cases, 10-year adjusted medians, and ratios of reported cases to median (epidemicity index) for meningococcal meningitis, United States, 1940-51

Year	Jan.- Mar.	Apr.- June	July- Sept.	Oct.- Dec.
A. Reported cases ¹				
1940.....	528	432	324	347
1941.....	612	559	382	431
1942.....	911	1,076	660	1,111
1943.....	5,577	6,407	2,506	3,484
1944.....	7,046	4,706	2,085	2,257
1945.....	3,231	2,164	1,283	1,357
1946.....	2,512	1,407	829	849
1947.....	1,091	985	622	701
1948.....	1,115	856	618	787
1949.....	1,106	898	632	837
1950.....	1,201	998	651	849
1951.....	1,401	1,058	724	972
1952.....	1,685			
B. 10-year medians of cases ²				
1940-49.....	1,384	1,105	689	958
C. Ratios of reported cases to median (epidemicity index)				
1940.....	0.38	0.39	0.47	0.36
1941.....	.44	.51	.55	.45
1942.....	.66	.97	.96	1.16
1943.....	4.03	5.80	3.64	3.63
1944.....	5.09	4.26	3.03	2.35
1945.....	2.33	1.96	1.86	1.42
1946.....	1.81	1.27	1.20	.89
1947.....	.79	.89	.90	.73
1948.....	.81	.77	.90	.82
1949.....	.80	.81	.92	.87
1950.....	.87	.90	.95	.89
1951.....	1.01	.96	1.05	1.01
1952.....	1.22			

¹ Quarterly reported cases received from National Office of Vital Statistics.

² The median is a mid-point above and below which half of the experience tends to fall. To reduce the effect of erratic fluctuations, medians were taken as the geometric mean of the four middle items in each quarterly array. (A geometric mean locates the median position more dependably than does an arithmetic mean in epidemic series.) A 10-year span (1940-49) was taken in calculating the quarterly medians instead of the more conventional 5-year span so as to include approximately one entire epidemic wave. For a disease with a long cycle, the 5-year span tends to give relatively high medians near epidemic peaks and low ones near the trough. This may distort the epidemicity index somewhat. The philosophy behind the ratio of current cases to median cases as an "epidemicity index" has been discussed previously (9).

with the corresponding wave of the annual mortality rates (fig. 4) shows that the two are nearly parallel, indicating that the quarterly

index yielded about the same shape of epidemic wave as the annual data. The quarterly index as shown on the graph and in table 4 indicates that:

1. During the 1943 epidemic, reported cases rose to about six times the 10-year medians for corresponding quarters.

2. At the end of the subsequent 5-year decline, the national cases dropped to a low of 0.73 of the median in the fourth quarter of 1947, and since that time the cases have gradually risen to, or slightly above, the median values during most of 1951.

3. For Maryland, the epidemicity index showed about the same wave as the United States although, largely because of smaller numbers, the Maryland curve fluctuated more violently (14).

4. On the basis of reports (12b) to the week ending March 29, 1952, it is estimated that the reported cases for the United States during the first quarter of 1952 equalled 1,685. The median expectancy for the quarter being 1,384, there results for the first quarter an estimated index of epidemicity of 1.22, compared with 1.01 for the previous quarter. The index has, therefore, risen considerably higher in 1952 than is suggested by the conservative estimate shown in figure 5, prepared early in March.

Army vs. Civilian Morbidity and Mortality

From 1930 to 1951, the reported Army meningitis cases generally exceeded civilian cases considerably. The excess Army morbidity was highest at times of heavy induction or discharge of forces and lowest during periods of relatively stable strength. Sartwell and Smith (4), Thomas (3a), and others have reported that meningitis rates among recruits are highest within a few months after induction.

That the rise and fall of meningitis in the Army is strongly influenced by inductions and discharges is indicated in table 5 and figure 6:

1. The Army morbidity rate was below the civilian rate in but one year, 1933—a period when the armed forces were apparently stabilized at a fairly low level (table 5, last column).

2. Morbidity increased to epidemic peaks in 1935-37 and 1943, when Army rates were four to eight times the civilian rates. These increases in morbidity were approximately, though not exactly, coincident with heavy inductions into the armed forces. From mid-year 1940 to 1941, for example, Army strength was multiplied by 5.5.

3. The unexpected rise of Army rates in 1946 to about 10 times the civilian rates is associated with a period of rapid demobilization. June 30 Army strength declined from 8.2 million to 1.9 million in less than one year, with consequent congestion of travel facilities and separation centers.

4. The morbidity increase in 1951 was concurrent with mobilization for Korea.

In comparing military with civilian morbidity statistics, one must note the difference in reporting. Case diagnosis and reporting is usually more thorough in the military than in the civilian population. On the other hand, civilian statistics are expanded in the young adult ages by the more complete reporting to civil health authorities of cases from local Army camps.

Army mortality was about equal to the civilian mortality rate in the early 1930's, but it rose much higher during periods of appreciable induction or demobilization of personnel and declined toward the civilian rate during periods of strength stability. The effect of the newer therapies has been apparent during the past 8 or 10 years. The Army death rate nearly

Table 5. Annual mortality, reported morbidity, and apparent case fatality rates for meningococcal meningitis, United States, U. S. Army,¹ and U. S. Navy,¹ and U. S. Army strength, 1930-51

Year	Death rates per 100,000 ²			Reported cases per 100,000 ²			Apparent percent cases fatality ³			U. S. Army strength in 1000's (June 30) ⁴
	United States	U. S. Army	U. S. Navy	United States	U. S. Army	U. S. Navy	United States	U. S. Army	U. S. Navy	
1930-----	⁵ 4.0	6.6	9.4	⁵ 7.2	21.0	37.5	⁵ 55.1	31.2	25.1	138.4
1931-----	2.7	1.5	3.6	4.7	16.	13.3	57.3	9.3	27.1	-----
1932-----	1.7	2.3	1.8	2.7	4.	8.1	61.6	56.7	22.2	-----
1933-----	1.4	.73	.9	2.4	2.	2.8	60.3	36.5	32.1	-----
1934-----	1.2	3.7	7.3	1.9	6.	22.9	61.9	61.8	31.9	-----
1935-----	2.5	3.6	7.0	4.9	14.	27.2	50.1	25.4	25.7	138.6
1936-----	2.6	4.3	9.6	5.5	19.	41.0	46.7	22.4	23.4	-----
1937-----	2.0	4.0	3.8	4.1	14.	18.1	48.2	28.5	21.0	-----
1938-----	.94	1.6	2.2	2.2	6.	5.0	42.9	27.3	44.0	-----
1939-----	.60	1.1	0	1.5	3.	1.3	40.8	35.0	0	-----
1940-----	.50	.89	1.0	1.3	3.	6.9	39.4	29.7	14.5	267.8
1941-----	.53	1.0	.9	1.5	12.	5.2	34.9	8.7	17.3	1,461.0
1942-----	.75	2.3	1.9	3.0	32.	29.5	25.3	7.0	6.4	3,074.2
1943-----	2.3	3.9	3.7	14.1	96.	78.0	16.0	4.1	4.7	6,993.1
1944-----	2.2	1.4	1.4	12.6	41.	34.3	17.3	3.4	4.1	7,992.9
1945-----	⁶ 1.2	.81	.7	⁷ 5.7	17.	13.3	21.4	4.8	5.3	8,266.4
1946-----	.89	1.47	.6	3.9	40.	12.1	22.5	3.7	5.0	1,889.7
1947-----	.64	.98	.5	2.4	21.	5.8	27.1	4.7	8.6	989.7
1948-----	.60	.52	.6	2.3	13.	6.3	26.0	4.0	9.5	552.2
1949-----	⁸ .55	.35	.2	2.3	12.	5.4	23.4	2.9	3.7	658.7
1950-----	.64	.28	0	2.5	9.	2.8	25.9	3.1	0	591.5
1951-----	.72	.89	(⁹)	¹⁰ 2.7	16.	4.7	26.7	5.6	(¹¹)	1,529.7

¹ U. S. Army and U. S. Navy Offices of the Surgeons General. ² Army and Navy rates are per 100,000 mean strength per year. U. S. rates are per 100,000 population. ³ Apparent case fatalities are percentage ratios of death rates to reported case rates. ⁴ See reference 13. ⁵ 1930-44 data are from tables 2, 3, and 4, in reference 5. ⁶ 1945-48 deaths from Vital Statistics of the United States, Part II. Place of Residence (NOVS). ⁷ 1945-50 cases from *Public Health Reports* annual summaries. ⁸ 1949-51 deaths estimated from Current Mortality Analysis, 10 percent sample (NOVS). ⁹ Navy death rate (annual basis) for the last 6 months of 1951 was 0.4 per 100,000 mean strength. Data for the first 6 months not immediately available. ¹⁰ 1951 cases estimated from Weekly Morbidity Report (NOVS) 2:52 (Jan. 5, 1952). ¹¹ Underlying data not available.

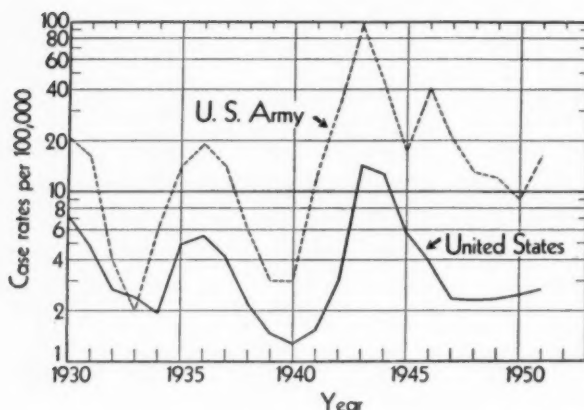


Figure 6. Reported case rates for meningococcal meningitis, United States and U. S. Army, 1930-51.

tripled, however, during the 1950-51 remobilization (fig. 7 and table 5).

Case Fatality and Case Reporting

The inference that case reporting in meningococcal disease has deteriorated was first made when it was observed in Maryland that the apparent case fatality (ratio of deaths to recorded cases) had increased from 15.3 percent in the 1943 epidemic year to 36.5 percent in 1950 (14). In other words, in 1943 more than six cases were reported per death; in 1950 reported cases per death were less than three. For the United States, likewise, the ratio of reported cases to deaths has declined from 6:1 to about 4:1 (12).

These observations threw suspicion on the statistics, for it did not seem reasonable that case fatality should increase when dramatically successful new therapeutic agents were coming increasingly into use. Figure 8 and table 5 do not indicate a similar rise in the case fatality ratio for the United States Army during the same 8 years. In fact, there was a decline of nearly 90 percent during 1940-44, and the Army case fatality ratio remained fairly steady at about 4 percent through 1950, against a "statistical" civilian fatality of about 25 percent.

A number of explanations for the rise in apparent case fatality in the civilian community suggest themselves. For example, age-adjusted calculations indicate that in Maryland approximately one-fifth of the rise in apparent case fatality in the State could be attributed to the

growing proportion of infants and young children, who have a higher case fatality than adults (table 1). Possibly, part of the effect was produced by better case reporting during epidemics than between, although data prior to 1939 do not point to this as the major distorting factor (14).

A more plausible explanation of the rise in apparent case fatality is offered by Dr. Harold E. Harrison of Baltimore City hospitals. He stated that during recent years physicians have greatly increased their use of antibiotics and sulfa drugs in febrile cases; hence, they have probably cured many mild cases of meningococcal disease so promptly that case reports seemed unnecessary, if indeed this diagnosis was reached at all.

The declining trend of the ratio of civilian to Army case rates during the past 10 years or more, as suggested by figure 6, is consistent with the inference that civilian case reporting has been rather seriously incomplete in recent years.

Discussion and Summary

Likelihood of an epidemic. Information on the factors underlying epidemic potential are too scanty and crude to warrant categorical predictions. There are, however, the following indicators as to whether a continued rise is in prospect:

1. On a national scale, the cyclic movements of this disease have been exceptionally clear-cut and regular during more than three decades. Thus, when an epidemic wave started upward,

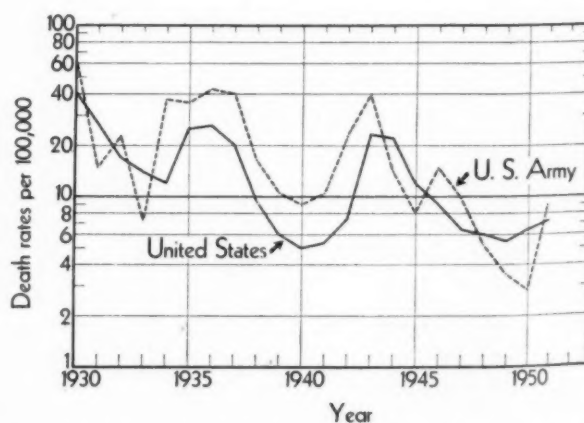


Figure 7. Death rates for meningococcal meningitis, United States and U. S. Army, 1930-51.

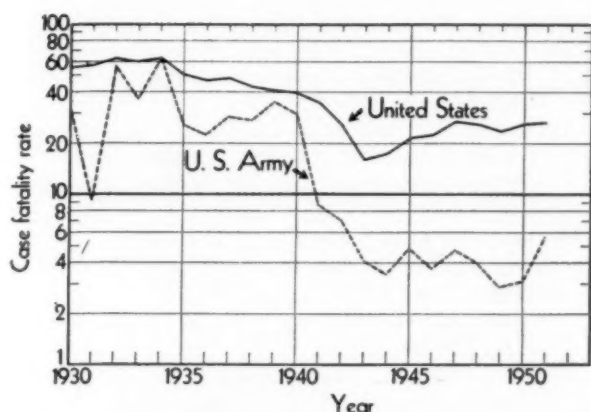


Figure 8. Apparent case fatality for meningococcal meningitis, United States and U. S. Army, 1930-51.

it tended to continue to an appreciable epidemic peak (fig. 4). Initial rises have been evident during the past year or two in the military and in the United States. (Table 5 and figs. 6 and 7.)

2. It has been approximately 9 years since the last epidemic peak in 1943; this is already somewhat longer than the average inter-epidemic interval.

3. The annual national birth rate since the last epidemic (23.0 per 1,000 population) has been about 50 percent higher than during the 9 years prior to the epidemic (15.6 births per 1,000). In other words, there has been an unusually heavy inflow of susceptible persons into the population.

4. The present unusually high industrial activity, high rates of travel, and build-up of the armed forces are conditions of high contact which in the past have been associated with epidemic development. Though conceivably the newer drugs might interfere with spread of the disease, figure 6 indicates that Army case rates could be high even with extensive use of the newer drugs. The major effect of the drugs in the Army was to reduce mortality rather than morbidity.

In the light of the stated potentials, the prudent assumption is that higher case and mortality rates may occur in the civil community during the next year or longer, although the normal seasonal declines may be expected from late spring to about September.

Current information. Since civilian case reports are clearly incomplete and could be influ-

enced by publicity, it is believed that deaths will in the future yield a more trustworthy index of epidemicity than reported cases. If current information concerning the proportion of type I meningococci found in State and local diagnostic laboratories can be published, such information may be useful as a danger signal.

Magnitude of problem. Deaths from meningococcal meningitis in the United States during the latest two major epidemic years, 1943 and 1944, totaled 5,739. Although this number is not huge, it exceeds by a considerable margin the number of deaths during those 2 years from such diseases of public health interest as measles (3,224), acute rheumatic fever (2,972), poliomyelitis (2,512), diphtheria (2,341), typhoid and paratyphoid fever (1,234), and scarlet fever (873).

Preventive measures. Although the number of persons likely to be infected in an epidemic is enormous, the number of frank cases is relatively small, and the real danger comes from the risk of death after attack.

Prophylactic chemotherapy was employed during the last war in Army camps (3b, 4) and was apparently successful in reducing the number of carriers and cases appreciably. However, Maxcy (1) gives reasons why this protective device should be regarded as experimental. Experimentation in the field of antigens for immunization and for testing susceptibles (17, 1, 2) will also be observed with interest.

For the present, apparently, major reliance must be placed upon prompt diagnosis and treatment. This is not easy because of the rapid course of the disease at times, and because of the sporadic distribution of recognized cases.

Obviously, for a disease like meningitis, best results are likely if the educational measures are particularly directed at the population in the areas in which the risk of attack is greatest: in the most congested parts of cities; in camps and institutions; among Negroes; and among the more susceptible rural groups migrating to congested areas such as industrial centers and military induction camps.

Finally, it is to be remembered that infants have the highest rate of attack and also that infants and the aged have a high case fatality (table 1).

ACKNOWLEDGMENTS

In the preparation of this report, cooperation was received from many different sources. The writer is particularly indebted to the following: Dr. James Strain, for his review of recent literature; Dr. Dean Roberts, deputy director of the Department of Health, for making this report possible and for helpful suggestions; Drs. Kenneth F. Maxcy and Philip E. Sartwell and their associates in the department of epidemiology at the School of Hygiene and Public Health of The Johns Hopkins University, who arranged for a discussion seminar; Dr. Fan, for the loan of his unpublished thesis (10)—because of communication difficulties, Dr. Fan's personal approval of publication was not obtainable; Dr. John Phair, for the loan of an unpublished manuscript; the offices of the Surgeons General of the Army, Navy, and Public Health Service, for unpublished statistics; and, to the various members of the Maryland State Department of Health, for their valuable assistance.

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The Total Patient-Care Approach To Chronic Disease

By JOSEPH F. FAZEKAS, M.D.

Chronic diseases are not limited to older persons. Yet, because they are, by and large, more common in older people, the care of patients with chronic disease and disability is the foremost medical problem in our aging population.

The annual frequency of disabling chronic cases among the age groups 65-74 and 75 and over is three to four times that among the population at large. Illness among the aged also lasts longer than among the population as a whole.

The real need for an organized community program to aid elderly patients who have chronic medical conditions is shown by the increasing numbers vegetating in "convalescent homes," occupying hospital beds, or simply on public assistance rolls. These people constitute a financial drain upon others as well as a great waste of potential human resources.

Since the community suffers a double loss, it has the responsibility both of preventing and of finding a remedy for the problems of chronically ill people. Admittedly, many of them cannot be restored to any kind of productive activity. Nevertheless, even more chronically ill persons are being consigned unnecessarily to a helpless existence.

The Goal of Total Patient Care

The purpose of a total program for the management of patients with chronic disabilities should be to restore them to a state of optimum

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usefulness in society. The problem is economic and social as well as medical. All therapeutic facilities should be available to these patients, but they may also need at least minimum financial assistance to provide for the necessities of life and for those other requirements (such as transportation to treatment areas, pharmaceuticals, and appliances) imposed by age, disease, or disability. This assistance should not be limited to indigent citizens. Persons of our so-called middle class should be qualified to receive treatment in all phases of the program without exorbitant expense. Otherwise they may forego needed rehabilitative services until it is too late.

If total patient care is to be effective, educational programs for various professional and lay groups as well as for patients must be undertaken. In our medical schools, undergraduate instruction should emphasize the importance of economic and social factors in the management of chronic diseases. Physicians would then not be completely absorbed with the diagnosis and treatment of disease entities. The public should be informed of the importance of early detection and treatment of all chronic diseases, and particularly those so frequently encountered in old age. Families must again realize that they have a certain responsibility for the care of their chronically ill members.

Moreover, all patients with a chronic disease should receive specific instructions regarding their illness, to prevent exacerbations and to delay progression as much as possible. In many cases, group educational therapy would be of great value in promoting improved self-care of patients who have the more common chronic diseases such as obesity, diabetes mellitus, peripheral vascular disease, and chronic cardiac

disease. The community as a whole should be taught the necessity of providing for rehabilitation. Finally, industry should be informed about the excellent work potentialities of rehabilitated persons, and its fears about employing them should be allayed.

The development of an effective program for the management of chronically ill persons would require little more than the expansion and integration of existing community facilities. The total patient-care approach, however, will never be achieved unless these facilities are organized into a coordinated unit. The various health department bureaus would function more efficiently and economically if they were combined in a direct medical service unit, just as would all direct medical services if they were part of a hospital unit. With such an integrated organization, medical school curriculums could provide experience in care of patients both within the hospital proper and in all branches of medical care that the student may encounter after graduation. In addition, the practicing physician could make better use of community facilities if auxiliary services were more accessible to him. The specific needs of his patients, whether they were early case finding, continued medical supervision, occupational therapy, vocational selection, or home care, would be more efficiently satisfied. Some of these needs are discussed below as facets of a total program.

Case Finding and Selection

The identification of disease stages after the appearance of symptoms is manifestly less satisfactory than the detection of early asymptomatic cases. In the latter, hospital treatment is still unnecessary and the patient is able to earn his own way. This is particularly true of the many chronic diseases frequently found in the elderly population, and which are usually diagnosed and treated only when hospitalization becomes necessary.

Different methods of early case finding and selection have been tried throughout the country. There have been large and successful detection drives for tuberculosis, venereal disease, and diabetes mellitus. Usually these have been limited to laboratory and X-ray procedures and by no means are intended to take the place of a

thorough physical examination by a physician, plus diagnostic tests.

Because of some doubt as to the efficiency of organizing separate campaigns for each disease, the concept of the "multiphasic screening line" has developed. This is designed to detect early evidence of a large number of common chronic diseases in a single short visit to a detection center. Many communities will probably establish such facilities permanently because they can be operated with a minimum of administrative expense and inconvenience to the individual.

In a total care program, definitive diagnosis of actually or potentially disabling chronic disease should be made by private physicians, by ambulatory diagnostic clinics of hospital outpatient departments, and occasionally by the hospital itself. Many patients would be referred from screening lines to these facilities for full investigation of abnormal findings, others would seek medical attention because of symptoms related to their chronic diseases or to incidental illnesses. Definitive diagnosis would disclose two large categories of incapacitating illness: those which are amenable to treatment and can be arrested, and those which are inexorably progressive. Nothing need be said here about those persons afflicted with a disease which can be completely arrested with adequate therapy before disability occurs. Patients for a total care program should be selected because of the presence of residual handicaps after arrest of a disease process or because of the probability of the appearance of varying degrees of incapacity.

Medical Care

Once a definitive diagnosis has been made, the nature of further medical attention should depend upon the patient's particular disease state, the source of his care, and his financial limitations. Uninterrupted medical supervision is absolutely necessary for the prevention or amelioration of exacerbations. The present tendency toward providing care only when exacerbations become severe enough must be reversed.

When the patient's financial status permits, medical care should be provided from the out-

set by a private physician. If the patient is indigent, out-patient clinics, held in the evening as well as in the daytime, should be available. When distance or the patient's disability makes these clinics inaccessible, the medically indigent must be transported to them or be given domiciliary care.

Rehabilitation

Many people can meet the costs of medical supervision alone; relatively few can afford to pay for the ancillary services which are so necessary for complete rehabilitation. Deprived of these facilities, people continue at their usual occupations as long as their physical condition permits. Then, depleted of their resources, they become completely dependent upon relatives or the community.

Rehabilitation efforts should supplement the medical treatment of chronic disease in such a way as to restore or maintain to the optimum degree the individual's physical and mental state and his usefulness to society and himself. Whenever possible, these efforts should anticipate the actual need and be instituted before incapacity has appeared. The physician should direct the rehabilitation program, but he cannot provide his patients with physical, occupational, and vocational therapy, find them suitable positions, or provide assistance for their dependents during the period of readjustment.

Many of the ancillary services needed by patients with chronic disease already exist in individual private organizations. Because of their cost, however, they are not all available to the average patient. The community cannot establish competitive services, neither can it afford to let its needy members suffer. The most reasonable solution to the problem would be the establishment of a community rehabilitation center to which physicians could refer patients for any ancillary services required. The center could be financed by both the community and the individual with the latter contributing a proportion of the service costs according to his financial status. It would aim, not to provide permanent care, but to enable chronically disabled patients to care for and maintain themselves as long as possible. Thus it would give the middle-income groups some protection

against the prospect of inadequate support for an indefinite period. Some of the services that would be helpful to the practicing physician which could be provided in the rehabilitation center follow.

Physical Therapy

If an incapacitated person is given physical therapy, it may prevent further deterioration and restore function to such a degree that he will not have to change his occupation. When this frequently difficult change of occupation is necessary, the patient's residual physical abilities should be preserved and improved in order to provide the largest possible range of vocational choice and the basis for maximum proficiency in whatever he does.

The paucity of good physical therapy services in most communities is due to limitations of floor space in appropriate institutions, to lack of properly trained personnel, or to the high initial outlay these services require. A community health center or hospital is the logical site for the bulky and expensive equipment used in physical therapy, so necessary for the ambulatory treatment of many chronic disease patients.

Vocational Selection and Training

It is necessary to determine the patient's optimal occupation and to train him for it. His choice of work should be dictated by his physical and mental capacities, his personal preference, and the financial opportunity available in his preferred line of endeavor. In any occupational planning program, local employment needs should be constantly surveyed so that jobs selected will be important and useful.

Occupational training should be available to those patients whose age and physical disabilities require that they change jobs. In a large proportion of cases, vocational training will include occupational therapy; in all cases, its goal should be self-support. Training eventually may provide financial independence and also improve physical status by strengthening muscles, improving coordination, and increasing joint range. Where supervised graded training in selected vocations is available, there should

be sheltered workshops for the more severely disabled patients in the community center.

Laboratory Services

A well-equipped laboratory offering complete clinical studies at reasonable cost would be invaluable to the care of the middle-income, chronically ill patient. Physicians know well that much of the cost of good patient care is due to the many laboratory studies often essential for a complete diagnostic work-up. The indigent patient receives such services at community expense. The patient in the middle-income range can usually afford them during an acute illness, but their cost is prohibitive during continued control of chronic illness.

Research

Much research will be required to establish criteria by which those persons most suited for the services of a total rehabilitation program can best be selected. The cost of rehabilitation is unquestionably increased by inaccurate estimates of the work tolerance and capacity of patients with chronic disease and the time needed to help them. Inevitably, many patients are carefully treated and trained only to deteriorate, perhaps to such an extent that rehabilitation efforts fail. The community center is the logical site for research in these efforts, for the development of more efficient physiological methods which improve function, and for devising better prostheses and appliances.

Hospital Care

Hospital care is often necessary for chronic disease patients, who in fact, now occupy most of the hospital beds. Some need it because of an acute onset heralding illness, most others because of exacerbations of the disease process, or incidental accident or sickness. For still other patients, definitive diagnosis will require short initial hospitalization.

Nevertheless, making more hospital beds available to patients with chronic diseases is not the best solution of the problem. Most hospitals are still mainly geared for acute medical and surgical disturbances. Too often, for the pa-

tient with a chronic illness, they are unnecessary and expensive—in fact, nothing more than places of residence. Moreover, the inactivity and isolation imposed by a prolonged institutional existence often causes further physical and psychological deterioration. Once families and physicians have disposed of their obligations, they are often reluctant to reaccept responsibility for continued care, and the patient may find it difficult to adjust to a home atmosphere filled with resentment.

When hospitalization is specifically required, chronically ill patients may be referred to private institutions or to community hospitals. Treatment of acute medical and surgical conditions should be followed by transfer to convalescent wards, where active rehabilitation can be instituted or continued. Such facilities would greatly reduce community costs through reductions in nursing personnel and because patients could perform a large proportion of the maintenance work. Some physicians could attend acute medical and surgical cases. Other physicians could give their entire attention to the care and rehabilitation of patients convalescing from exacerbations of chronic disease. Relieved from other duties, the physician would be less likely to ignore the chronically ill patient for "the interesting case in the next bed."

Concentrated efforts toward the rehabilitation of some convalescent patients should significantly shorten their hospital stays. Once they are self-sufficient, they can be discharged to their homes and referred to the community rehabilitation center, where rehabilitative efforts can be continued.

Home Care

The home care medical program, which has been for the most part restricted to the indigent population, has been demonstrated to be of great value to both the patient and the community. It gives the patient the opportunity to remain in the family environment even though he may be totally incapacitated, thus providing the psychological drive so important for the optimum degree of recovery. It protects him, too, from the physical and emotional deterioration so frequently associated with long periods of hospital

confinement. It shifts the responsibility for his care back from the community to the family, which is often willing and able to assume the responsibility if given the necessary technical assistance.

The cost of home care for an individual patient is about one-quarter the cost of hospital care. Home care, too, leaves badly needed beds available for "acute" cases. It should not be restricted to the indigent. There is no reason why private patients cannot remain under the complete supervision of their physicians at home while receiving the ancillary services provided by home care technique.

Terminal Medical Care

There will always be patients who do not respond to rehabilitation efforts, either because of the nature of their disease or because the dis-

ease is in a terminal phase. These patients should be cared for in separate quarters if they cannot be kept at home or in supervised nursing homes.

Conclusion

The adoption of the concept of total patient care and its application to the various phases of the management of chronic disease is basic to the formulation of a chronic disease program. The success of any such program will depend upon the coordinated efforts and leadership of medical societies, medical schools, and community health officials. When the entire community is conscious of the chronic disease problem and all its existing facilities are integrated and working for total patient care, its responsibilities to patients can be more satisfactorily discharged.

Dr. Joseph W. Mountin, Pioneer in Public Health, 1891-1952

Dr. Joseph W. Mountin, Assistant Surgeon General and Chief of the Bureau of State Services of the Public Health Service, died unexpectedly April 26, 1952, at the age of 61. A Public Health Service officer for 35 years, Dr. Mountin was appointed to the post of Bureau chief November 1, 1951.

Dr. Mountin had a distinguished career with the Public Health Service and was widely known as the "father" of many Service programs.

He was a special health adviser to the Bhor Commission for the Government of India in 1947. During 1949, he was adviser on health and welfare to the Economic Mission to Colombia, South America, sponsored by the International Bank for Reconstruction and Development. At the time of his death, he was Public Health Service director of the evaluation of the 10-year health and sanitation program of the Institute of Inter-American Affairs.

The author of numerous studies and monographs on preventive medicine, public health administration, and medical care, Dr. Mountin was a diplomate of the American Board of Preventive Medicine and Public Health and a fellow of the

American Medical Association. He was a fellow of the American Public Health Association and a member of its Executive Board. He was also a member of the Board of the National Organization of Public Health Nursing and had served on many official committees of other health organizations.

He was known as an authority in a wide range of public health fields from environmental health programs, such as sanitation, water pollution control and industrial hygiene, to public health nursing, public health education, the control of chronic diseases, and problems of the aging.

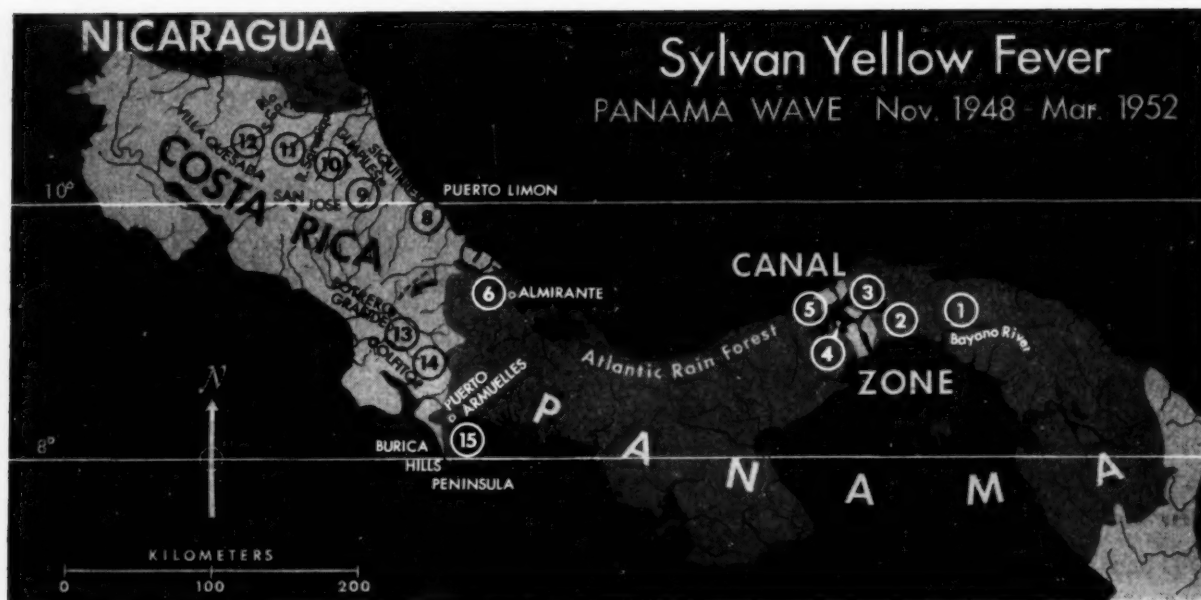
Dr. Mountin was born in Hartford, Wisconsin, and received his medical degree from Marquette University, Milwaukee, in 1914.

He began his career with the Public Health Service during World War I in work in extracantonment sanitation in military areas throughout the United States. He was director of the Division of Public Health Methods from 1937 to 1939 and of the States Relations Division from 1943 to 1947, when he became associate chief of the Bureau of State Services.



"Dr. Mountin was one of the real pioneers of public health in modern times. He was a man of rare gifts, of many skills, of much imagination who, throughout his long and distinguished career, provided the spark for many of the major programs of the Public Health Service and the public health movement. His wisdom, his progressive leadership, and his warm and sympathetic understanding of medical and health problems will be widely missed. His passing is a great loss to the Service and to the public health profession in the United States and throughout the world."

—LEONARD A. SCHEELE, M.D.



Sylvan Yellow Fever

in

Central America

By NORMAN W. ELTON, M.D.

A dramatic episode in the history of medicine is now being enacted in Central America. A wave of jungle yellow fever has moved from the long-established enzootic region of eastern Panama to the forested plains of northern Costa Rica, progressing some 450 miles since November 1948. In its wake it has left 41 proved human fatalities among the farming population, 8 in Panama and 33 in Costa Rica. Complete autopsies have been performed and the

Colonel Elton is a U. S. Army medical officer on duty with the Governor, Canal Zone Government. He is director of the Board of Health Laboratory at Ancon.

cause of death confirmed by several laboratories.

The velocity of this wave is only 12 to 15 miles per month, following a pathway delineated by forest continuity, tree-top mosquitoes, and arboreal mammals (especially the primates). Although advance areas in its projected path have been repeatedly alerted to anticipate its arrival—since the recognition of its existence as a wave in January 1950—sporadic cases and epidemic outbreaks have continued to occur in spite of control measures.

The wave appears to move in halts, by insidious infiltration, and in bursts, depending on natural conditions. Although their nature is still poorly understood, these movements are undoubtedly based on population density and

Epidemic Centers and the Path of the Wave

The valley of the Bayano River ① and the region east of it have been recognized as an enzootic area for sylvan (jungle) yellow fever since 1929 (see map).

The Pacora area ② in November and December 1948 was the site of five fatalities among the farming population. These deaths may have been due to yellow fever. Histologic examination of the liver proved yellow fever to be the cause of death in two cases; in two others no liver tissue was saved for histologic study; and the remaining case exhibited an atypical liver lesion which was not diagnostic.

In August and September 1949, while it was still not realized that a yellow fever wave was in progress, three fatalities in which the typical liver lesion was confirmed occurred in the Buena Vista area ③.

In Gatun Lake, Barro Colorado Island ④, established in 1923 as a government reservation and wildlife preserve, is the home of about 30 clans of howling monkeys, which are particularly susceptible to yellow fever and suffer a high mortality. Early in 1951, studies indicated that some epizootic, probably shortly after the dry season of 1949 (January-April), materially reduced the population of these monkeys.

A human fatality from yellow fever occurred in the Chagres District ⑤ west of the Canal Zone on the Atlantic side in January 1950 and the pattern of the wave was recognized for the first time. Within 2 months the Minister of Public Health of Costa Rica was informed through diplomatic channels that the wave could be expected to reach Costa Rica in from 14 to 18 months. At the same time a fruit company subsidiary at Almirante ⑥ was alerted to watch for the wave after it had passed along the sparsely inhabited Atlantic rain forest.

Autopsy tissues, received in April 1951, confirmed the diagnosis of yellow fever in a chainman engaged in a highway survey in the forest about 10 kilometers west of Almirante. Within a week after this diagnosis was made, an intensive vaccination campaign was initiated in Costa Rica.

In June 1951, the virus of yellow fever was isolated from the serum of a patient admitted to the Almirante Hospital from a Costa Rican farm just across the border near Nivecita, Panama ⑦. This patient recovered.

Heralded by an initial fatality near Puerto Limon ⑧ on July 24, 1951, epidemic jungle yellow fever developed with explosive violence along a 100-mile front in North-

ern Costa Rica involving five epidemic centers ⑧ ⑨ ⑩ ⑪ ⑫ in rapid succession and almost simultaneously. These were as follows:

Epidemic center	Proved fatalities	Date of first and last fatalities
Puerto Limon-----	2	July 24; Aug. 1.
Pacuarito-Siquirres-----	3	Aug. 12; Aug. 20.
Roxana-Guapiles-----	3	July 27; Sept. 9.
Sarapiquí watershed----	19	Aug. 13; Sept. 30.
San Carlos watershed---	6	Aug. 19; October

Early in October 1951 reports of the finding of many dead monkeys in the vicinity of Potrero Grande ⑬ were confirmed by the Director General of Public Health in Costa Rica. Panama was promptly informed. At the same time a serum specimen from a patient from this region, convalescing from clinically suspected yellow fever, reacted positively to the mouse protection test. Although skeptical about the significance of these findings, because of the high elevation of the continental divide in this region, an intensive revaccination campaign was immediately undertaken in western Panama on the Pacific side.

In January 1952, the Director of Public Health of the Republic of Panama was informed by Costa Rica that a mine laborer from the Coto District ⑭ had died in a Golfito hospital and a diagnosis of yellow fever had been histologically confirmed.

On February 10, 1952, a 23-year-old resident of the Burica Hills Peninsula died at a Puerto Armuelles hospital ⑮. This peninsula is hilly, forested, and populated by howling monkeys. The diagnosis of yellow fever was confirmed by two laboratories and the Armed Forces Institute of Pathology.

The probable location of the crossing of the continental divide is indicated by the arrow above Potrero Grande ⑬ where there is a heavily traveled trail leading from the Talamanca District on the Atlantic side to the valley of the Cabagra River on the Pacific side. Since the lowest elevation in the divide is between 5,000 and 7,000 feet at this point, it is considered likely that the virus was introduced, in May or June 1951, into the Pacific forest by a migrant farmer from the Atlantic side.

This offshoot of the main wave may move eastward after 2 or 3 months of rainy season (July-August 1952). It is now also moving northwest up the Pacific coast of Costa Rica as a secondary wave.

terrain and seasonal factors, as well as on the efficiency of vaccination campaigns. During the past 3 years the wave has swept successively westward across Panama and Costa Rica, and has crossed the continental divide to the Pacific side of southern Costa Rica, threatening to return eastward through the Pacific watershed of

Panama. There is no indication as yet that the main wave can be expected to stop until it reaches the forests of Vera Cruz and Tampico in Mexico.

At first glance the control of sylvan yellow fever seems simple, involving vaccination of the rural population as merely an administrative

matter. Experience has clearly demonstrated, however, that this is not easily accomplished. Although the Dakar (mouse brain) and 17 D (embryonated) yellow fever vaccines rank among the most efficient ever developed for the prevention of any disease, there are numerous factors that contribute to failure in the field. Improper storage of the vaccine may cause rapid loss of potency. The vaccine must be kept in a deep-freeze until issued for immediate use, for even while still within the ampule it cannot be expected to stand up under ordinary environmental temperatures longer than 1 or 2 weeks. When the ampule is opened, its contents must be used within an hour.

Swollen streams, muddy trails, dispersion of habitations, and even deliberate concealment of habitations in isolated regions contribute to the difficulty in gaining access to the farmers of the agricultural areas of the forest. Cooperation and understanding on the part of the farmers themselves is being obtained but is not yet fully achieved. Preliminary educational campaigns and the establishment of vaccination stations scheduled to open for operation on specified dates are necessary. Helicopters facilitate the reaching of isolated localities, and when the people are properly informed, their signal fires, spontaneously prepared when neighborhood groups assemble, attract the helicopter to unscheduled landings. The tremendous morale effect of the helicopter used for this purpose has been demonstrated in Costa Rica (3).

Complacency in yellow fever control would breed disaster for the farming population. Even in Costa Rica, where the epidemic was anticipated months in advance, the outbreak placed a severe strain on the facilities of the health department and the hospitals. Had the country not been prepared, the episode might have been a holocaust. Brazil, which has been working on the control of this disease since 1932, reported 400 deaths and more than 3,000 clinical cases in the recent great epidemic of 1950. Jungle yellow fever easily can be dangerously underestimated.

Epidemiology

Jungle yellow fever, except in its epidemiology, is the same disease as urban yellow fever.



In studies on the mosquito vectors of jungle yellow fever, human subjects are stationed on the forest floor and also on platforms in the canopy. The subject is placing a catching tube over a mosquito feeding on his arm. The ladder leads to a platform 45 feet up in the canopy where a second subject is making simultaneous catches (photograph by Dr. Harold Trapido).

It occurs, however, in rural areas, and involves mainly the farming population. In the Western Hemisphere it is known as "woodcutters' disease," since it is transmitted by the tree-hole-breeding mosquitoes of the forest canopy. These mosquitoes are most active around mid-day, and descend to ground level at the edge of the forest or in cultivated clearings, roadways, or riverways. Working in these clearings or felling trees to enlarge a farm are hazardous undertakings when the canopy mosquitoes are infected. One of the principal vectors in Brazil is *Haemagogus spegazzinii falco* Kumm, a tree-top mosquito, which has been found to be present in Panama and Costa Rica (7).

Until the discovery of jungle yellow fever in 1932 (16), the sylvan and urban forms were epidemiologically indistinguishable to histo-

rians. Reorientation is essential before proper historical interpretations can be made. Urban outbreaks have been known to originate, through a chain of infection, from the sylvan form of the disease: natives infected by the forest mosquitoes transmitted the infection to the *Aedes aegypti*, known since 1900 as the vector of the urban form. The reverse procedure might just as readily have originated sylvan outbreaks in the past, the disease being transmitted from urban foci in port settlements.

One of the transient reservoirs of the virus is known to be present in the arboreal primates (monkeys and marmosets), and such a reservoir may also exist to some extent in other arboreal mammals. Although certain species of the tree-top mosquitoes, such as *Haemagogus spe-*

gazzinii falco Kumm and *Aedes leucocelaenus*, are known to be vectors of the virus, other possible insect vectors are also being studied.

Sylvan yellow fever is primarily an enzootic or epizootic disease of the forest, with a high mortality for howling (*Alouatta*) monkeys. In fatal cases, these monkeys exhibit a liver and kidney pathology parallel to that found in rhesus monkeys and in man. During the recent outbreak of the disease in Costa Rica, specimens were studied from four howling monkeys, either shot or found recently dead. The kidneys exhibited a fully developed hemoglobinuric (lower nephron) nephrosis like that found in the human fatalities in Panama. The liver specimen from a monkey which was shot because it seemed ill exhibited the same type of convalescent yellow fever lesion encountered in rhesus monkeys during recovery after experimental infections. Of the other three liver specimens, two presented the classical, acute-phase liver lesion very much like that seen in man, and the third presented an acute lesion resembling that seen in experimentally infected rhesus monkeys. These diagnoses were made or confirmed at the laboratory of San Juan de Dios Hospital in San José, Costa Rica, and at the Board of Health Laboratory, Ancon, C. Z. The specimens are now among the accessions of the Armed Forces Institute of Pathology. The complete report on these wild "Vargas monkeys," in which the typical liver lesion of naturally acquired yellow fever has been observed, will be made at a later date.

Associated with the epizootic phase of jungle yellow fever, either simultaneously or lagging behind it by several weeks or months, is the epidemic phase involving the human population. That the epizootic phase is the precursor to the epidemic has long been known among the natives of Trinidad (13), and also in the lowlands of Guatemala (6). The howling monkey population in Brazil has been practically exterminated at times by waves of jungle yellow fever (12).

Pathological Anatomy and Clinical Pathology

During the westward passage of sylvan yellow fever across the Republic of Panama, complete autopsies were performed on the seven



Ladder and platform in the forest canopy where *Haemagogus* mosquitoes, vectors of jungle yellow fever, are caught as they attack human subjects. There are large seasonal fluctuations in the numbers of these mosquitoes. Long-term studies of them are being made by the Gorgas Memorial Laboratory in Panama and Central America (photograph by Dr. Harold Trapido).

proved fatalities from the disease. A complete autopsy also was performed on the most recent case occurring at Puerto Armuelles February 10, 1952. Three primary pathological processes appear to be involved in the mechanism of the disease, all of which may be considered interrelated: the hepatitis of yellow fever;



The black howling monkey, *Alouatta palliata aequatorialis* Festa.

the hemorrhagic diathesis undoubtedly resulting from this hepatitis; and the hemoglobinuric (lower nephron) nephrosis as a sequel of the hemorrhagic diathesis. Clinically these processes appear as (a) jaundice, (b) hemorrhages from mucous membranes, such as the vomiting of blood, and (c) uremia, frequently manifest by terminal convulsions and coma.

The hepatitis of yellow fever is diagnostic of the disease and has been accepted as the basis for the recognition of fatalities from yellow fever since 1930. Recognition of its histological specificity has evolved gradually since 1890 (1, 2, 9, 11, 15).

That the acidophilic material in the hepatic necrosis can be cleared from the polygonal cells with rapid regeneration of the liver cords (1, 10) was again noted recently in a Panamanian dying on the ninth day of illness, indicating that the liver lesion is a transient phenomenon. During its presence, however, the hemorrhagic dia-

thesis develops to a degree indicative of a profound prothrombin deficiency (4) although this has not as yet been established clinically.

Among the hemorrhagic phenomena accompanying the liver damage are melena, hematuria, hematemesis, nasal and oral mucosal bleeding, cutaneous ecchymoses, hemorrhagic pneumonia, and hemoglobinuric (lower nephron) nephrosis (5, 8). The plugging of the tubules of the lower nephron by heme casts is a recognized phenomenon productive of uremia, and retention of nonprotein nitrogenous metabolites in yellow fever, due to hemorrhage, blood in the bowel, and the kidney damage, is not only to be expected but has already been demonstrated (14). This would lead to a state of uremia, with the typical oliguria, anuria, and termination in convulsions and coma encountered in the classical form of the disease. Occasionally a confluent bronchopneumonia is superimposed on the hemorrhagic reaction in the lung, as in two of the Panama cases.

Death can occur, then, in either of two phases: (a) from the liver damage before the hemoglobinuric nephrosis and uremia are fully developed; or (b) from uremia due to the hemoglobinuric nephrosis after the hepatic lesion has begun to undergo involution. Liver and kidney specimens studied from the Panama cases support this concept of the major clinical pathological mechanism in yellow fever. Clinicians have long been more concerned about the development of renal failure than with liver failure in the disease. This interpretation awaits confirmation or modification from analysis of the extensive laboratory studies performed in Costa Rica by the staff of San Juan de Dios Hospital in San José during the recent epidemic in that country.

Outlook for Central America

Time seems generously disposed toward all concerned with the current wave of sylvan yellow fever in Central America. Presently, the main front of the wave appears stalled in the valley of the San Juan River between Costa Rica and Nicaragua, and its progress, if any, is insidious. There is no evidence as yet of an epidemic in Nicaragua, or of sporadic cases there. During this respite, the Ministry of

Health of Nicaragua has vaccinated more than 112,000 persons in the threatened areas.

Sporadic cases have been reported from the Pacific side of Costa Rica, mainly from the Cabagra zone, in the southern part of Puntarenas Province, close to the Panama frontier. This region first came under suspicion in October 1951, when dead monkeys were reported near Potrero Grande. On January 15, 1952, a confirmed human fatality occurred after an in-



A new clearing in the otherwise unbroken rain forest northwest of Almirante, Bocas Del Toro Province, Panama, characteristic of the situation in which jungle yellow fever is contracted by humans. Two human cases occurred here in April 1951 in a group of men surveying a right-of-way through the forest for a projected road (photograph by Dr. Harold Trapido).

fection acquired in the Coto area, and on February 10 a resident of Burica Hills Peninsula died from the disease at Puerto Armuelles in the southwestern end of the Republic of Panama. This indicates that in some manner the wave has crossed the continental divide in southern Costa Rica, and is now threatening to recross the Republic of Panama, but this time on the Pacific side and moving eastward.

This is probably the first time in modern history that a wave of sylvan yellow fever has moved through Panama and Central America in its pure form and with a directional trend due to its canalization in a relatively narrow strip of land by two oceans. It developed its initial focus (November–December 1948) east of the Panama Canal, on the Pacific side of the continental divide. It then moved over the divide at a low point (600–700 feet) into the Chagres watershed (August–September 1949), crossing the Panama Canal and reaching the rain forest on the Atlantic by January 1950. Thence it ran westward to Almirante and the Costa Rican border, remaining entirely on the Atlantic side. The Atlantic watershed of east-central and northeastern Costa Rica were involved from July to October 1951. A seeding of the Pacific side of Costa Rica threatens to involve the Pacific watershed of Panama with an offshoot of the wave.

All of the proved human fatalities so far have acquired their infections at elevations below the 2,000-foot contour, and most of them have occurred definitely below the 1,000-foot contour. This implies that the continental divide can act as a barrier and also canalize the movement of the wave, as it did in Panama in 1949–51. Circumstances which might be conducive to the crossing of the divide are not well understood, for although the Cordillera in Costa Rica is higher than it is in Panama, a crossing has already actually occurred there.

Outbreaks in Nicaragua may not be encountered until April or even July or August in 1952. This is only an inference based on experience in Panama and Costa Rica, and may or may not be applicable to the pertinent climatic, seasonal, and terrain factors of Nicaragua. Probabilities suggest that the wave will keep on moving. As the lowlands and extensive valleys of eastern Nicaragua are involved, new enzootic foci may become established. Whether or not the Pacific watershed north of Costa Rica will be involved remains to be seen, for the divide is broken by Lake Nicaragua at the Costa Rican border.

If the disease does establish itself in Nicaragua this year, and if there are enough critically located population centers involved, the opportunity for a long-term study of the behavior of such a wave will be assured. This

would call for cooperative effort by scientific personnel in all fields of biology, public health, and medicine. On the other hand, the wave may lose itself in uninhabited regions and reveal its presence only sporadically in scattered localities at long intervals, thus not exciting public interest again until a large community is involved. Or it may vanish as did the second Brazilian wave of 1944-45. At its present velocity it may not reach Guatemala and Mexico for 5 or 6 years, but it will continue to constitute a cause of illness and death for the farming settlements in its pathway.

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Vineyard Haven Hospital Closed

A decline to about 40 percent of capacity has led to the recommended closing of the Vineyard Haven Hospital of the Public Health Service. The 30-bed facility on Martha's Vineyard, Mass., no longer admits patients and is to be closed as soon as provision can be made for the patients now in the hospital. Its principal-beneficiaries are Coast Guardsmen and seamen for whom the Public Health Service will continue full responsibility, transferring all those requiring further hospitalization to the 300-bed Public Health Service Hospital in Boston.

The recent decision to close the hospital was based on the report of a special survey board that only 29 percent of the patients admitted in recent periods were local residents and that comparable Federal facilities were available nearby.

What's in the Health Council Idea?

The thirty-second annual meeting of the National Health Council was held in New York City on March 13 and 14. The program included two symposiums around the general theme, "What's in the health council idea?" One discussion dealt with "citizen participation in community health planning through community health councils" and was chaired by Miss Margaret A. Hickey, a vice president of

the National Health Council and public affairs editor of the Ladies Home Journal. The second panel, chaired by Dr. Robin C. Buerki, president-elect of the National Health Council and executive director of the Henry Ford Hospital in Detroit, discussed "health planning and action on the State level through State health councils." Public Health Reports presents, in brief, the nine "case reports" discussed.

Citizen Participation in Community Health Planning

Four Case Reports

The Professional Society



It was just about 12 years ago that the Columbus (Ohio) Academy of Medicine began to work with our Council of Social Agencies toward establishment of an organized plan for improving health services.

The first big step was employment by the council of Dr. Ira V. Hiscock of Yale University, to make a survey of health services in Columbus and Franklin County. The survey was completed in 1942. With great satisfaction we can report that nearly all the recommendations of that survey are today actual accomplishments.

Formation of Health Council

One of the first recommendations put into effect was the formation of the Metropolitan Health Council, in 1943. The membership of the council includes eight members appointed by our Council of Social Agencies, eight members appointed by our Academy of Medicine, and seven

members representing the Columbus Dental Society, the twelfth district of the Ohio State Nurses Association, the Columbus Board of Health, the Columbus Hospital Federation, the Colleges of Medicine and Dentistry at Ohio State University, and the Central Ohio Academy of Pharmacy. We believe that this membership constitutes a truly representative group of persons interested in our community health services.

The health council has been made an integral unit of the Council of Social Agencies and also works closely with the Columbus Academy of Medicine. In many cases, chairmen of academy committees are also chairmen of the health council committees.

It is obvious that with this type of organization the health council can

By Russell G. Means, M.D., past president, Columbus Academy of Medicine, and first president of the Metropolitan Health Council, Columbus, Ohio.

enlist powerful community support to back its studies and recommendations.

City Health Department

The present mayor of Columbus, when he first took office in 1944, called on the newly organized health council for advice about the city health department. Since then, he and the Columbus City Council have followed the report made by the health council almost to the letter.

Services added by the health department as a result of this report include a children's dental health service, seven well-child conferences, daily operation of the venereal disease clinic, annual examination of food handlers and barbers, a restaurant inspection program, a pest control department, and food handlers classes. In addition the meat inspection, milk inspection, and nursing services were extensively expanded. To house these new and expanded services, a \$1,200,000 city health center is being erected.

A survey of needs in the field of mental health by the health coun-

cil resulted in the establishment of a children's mental health center. This project was accomplished with aid from such organizations as the Junior League, Community Chest, Children's Hospital, and Ohio State College of Medicine, and is an especially good example of the marshaling of all resources available to get a needed program started as soon as possible.

Other Accomplishments

The health council has also played an important role in initiating hospital building programs. A hospital survey conducted under the auspices of the health council resulted in a 6½ million dollar fundraising campaign. With these funds, two of our general hospitals have already completed expansion and other hospital building programs are under way. We expect to have about 1,200 more beds as a result of these efforts.

Another activity of the health council was a survey of childhood accidents, followed by a workshop to acquaint the community with the extent of the problem and steps which might be taken to reduce the number of such accidents. Institutes and courses in community health programs for the orientation of student nurses, medical students, and staff and board members of voluntary health agencies also constituted an important part of the program.

It becomes apparent that our health council has accomplished much in a comparatively short time. And all the accomplishments have not been listed, by any means, in this short summary.

We would not want to give the idea, however, that all our goals have been reached. For example, we are working toward effecting a merger of the five separate health departments now functioning in our county, and toward an expanded school health program.

Such improvements in health services take time, but we are convinced that the health council idea speeds the achievement of such improvements. When citizens work together—and citizens include the medical profession—in the right

kind of organization—and this means the health council—you can be certain of one thing: Real improvements in health services will begin to appear in short order. We have proved it in Columbus.

The Civic Organization



There are three principal ways in which the civic organization through its members can assist in planning and developing the community health center program. These have to do with the organization, the operation, and the maintenance of the health center.

Organizing the Program

First, the civic organization can be instrumental in helping to create community consciousness of the health problem. The average member of a civic organization is just an average person, and as such he looks at the community health problem much as he does his own health problem, with a philosophy that says "as long as nothing has happened nothing is likely to happen." Therefore, it is necessary to get Mr. and Mrs. Average Member to realize that the problem of community health is his or her individual problem.

In my limited experience in working out a health program in the Mississippi Delta section of south-east Missouri, I have found that citizen participation is best obtained by presenting the problem (and the problem only) to the civic organization and then leading the group into a discussion of ways and means of solution. There follows a logical and natural sequence of individual thought, vocal expression of recognition of individual responsibility, and finally the pledging of time, effort, and often material assistance. If no health committee

exists, one should by all means be created within the civic organization.

The civic organization must never be approached with the thought that a health program is to be sold to them. They must rather be led to realize that as a part of the community it is their program and responsibility, and, therefore, they must actively engage in planning and developing the health program, center, or council.

Following Through

Second, the civic organization has an important part in bringing the health program into being. Under Missouri law, health programs are operated on a single-county basis or through a consolidation of two or more counties. They are supported by a county mill tax, which funds can be used for no other purpose. To set up a health center and work out a health program under this law, three steps must be taken—and here is where the civic organization through its individual membership plays its most important and essential role.

1. A petition for an election to vote the mill tax must be obtained, carrying a minimum of 10 percent of the voters at the last gubernatorial election. Without the help of civic organizations this would be an endless and insurmountable task, for the public today is tax conscious and the individual reaction when such a petition is presented tends to be negative.

2. The petition must be presented to the county court, for its approval and action in calling the election. The committee waiting on the court is made up of members from many civic organizations.

3. In the 90-day interim between court approval and election day, the health committees of the civic organizations and their individual members have the responsibility of carrying the plan and program into each and every voting precinct and on election day the task of getting out the vote.

In my home county, when the county court objected to the expense of judges and clerks for a special election, the civic organizations were

By Edward L. Corbin, past executive secretary, Missouri and Texas Farm Bureau Federations, and president, Board of Trustees, Scott County Health Center and Council.

able to obtain a full quota of clerks and judges who served without pay—a total of over 150 people. The proposition for a mill tax health center was carried by a majority of 8 to 1.


Finally, after the health center is established, its personnel employed, and the program under way, the civic organizations must continue their collaboration through their health committees and members. For example, cooperation with the schools in the conducting of immunization programs and special clinics is best obtained when the Parent Teachers Association uses its influence.

Sanitation Problem

Recently my home town, population 12,000, was confronted with a sanitary sewer problem. The county sanitarian from our health center refused to permit any new homes or industrial development to be tied onto the antiquated and inadequate sewerage system. This necessitated an election to vote a bonded indebtedness of over a million dollars, plus substantially increased taxes to retire it. Of course, this chain of events put the county sanitarian and the health program on the spot, but the civic organizations, namely, the chamber of commerce, women's clubs, federated clubs, and five luncheon clubs, went into action, and a comfortable margin above the required two-thirds majority was obtained in the election.

To summarize briefly: The leadership in the health program that fails to capitalize on the civic organization falls tragically short of opportunity.

The Official Agency

 The Washington County (Maryland) Public Health Association is both a health council and a health administering agency, with a unique record of community participation

By William M. Brish, superintendent of schools of Washington County, Md., and active member of the Washington County Public Health Association.

The Growth of The Health Council Idea

Health planning in the United States—for generations the exclusive province of the health officer, the physician, the welfare worker, and other professionals—is becoming a community activity in which the layman is now taking a leading part, according to a preliminary report issued by the National Health Council during its thirty-second annual meeting. The report summarizes the findings of a 2-year nation-wide study of local and State health councils.

At the time the study was begun there were 1,190 local and 34 State councils, three-fourths of which, it appeared, had been formed since 1940 and more than half since World War II. It is estimated that there are today probably more than 1,300 local councils and that State councils are being formed in three additional States.

Local councils, the report showed, are now in operation in one out of four counties in the United States. In each of the 91 predominantly urban counties—those with 50,000 or more population—there is at least one health council functioning.

On most of the health councils, four different types of organizations and agencies are represented: professional societies, official agencies, voluntary health organizations, and civic groups—with civic groups the most numerous. The councils, both State and local, thus bring together the housewife, the physician, the dentist, the nurse, the farmer, the worker, the business man, the educator, the health officer, the public official, the parent, and others with a direct or an indirect interest in community health.

A study of the activities of 276 local councils from 1947 to 1950 showed more than 1,000 specific projects undertaken. The projects ranged all the way from

starting a county health department and promoting hot lunches in schools to establishing clinics and helping local voluntary health agencies initiate programs. They were aimed at problems in such fields as social hygiene, safety, nutrition, industrial health, rehabilitation, maternal and child health, mental care, alcoholism, public health nursing, health education, and sanitation.

The 34 State health councils, the report indicates, were formed primarily to determine state-wide health needs, to promote legislation, to arouse public support for proposed health programs, and to encourage joint planning among health organizations for eliminating gaps and overlapping in their current programs.

Commenting on the report, Dr. Thomas D. Dublin, executive director of the National Health Council, said: "The rapid sweep of community organization for health is one of the most hopeful elements of our postwar society. Everywhere local citizens groups, voluntary health organizations, professional societies, and official agencies are learning to work together to safeguard and improve their community's health.

"The health council is the natural mechanism for such co-operative effort. It brings together all the varying points of view of groups dedicated to the solving of health problems. It is a forum for exchange of opinion, for joint planning and action. And it is the ideal mobilizer of the all-round public support so necessary for community effort."

The National Health Council is an association of 42 voluntary health and welfare organizations, professional societies, official agencies, and citizens groups interested in health. Part of its program is the encouragement of the health council movement.

in local health services. It traces its history to 1915, when the county tuberculosis association was organized, and its name to 1916, when it was known as the Washington County Tuberculosis and Health Association. In 1948, it became the Washington County Public Health Association.

All local official funds for health, except contributions to the State toward the health officer's salary, are disbursed through the association. By pooling official and nonofficial funds, our public health program has become quite flexible. Salary supplements were made when it was desirable to fill health department positions where the official salary failed to attract such qualified personnel as a pediatric consultant, a medical-social consultant, and a supervising nurse; and in another instance, to support a speech diagnostic clinic for a period of 6 months until official funds could continue the service.

The association holds regular monthly meetings to discuss planning, organization, budget, and general problems relating to the county program. It is composed of a variety of groups representing donors of funds and services and recipients of services. Three volunteer health agencies—the Washington County Tuberculosis Association, and the county chapters of the American Cancer Society and the National Foundation for Infantile Paralysis—contribute to the salary and expenses of the executive secretary, appointed in 1950 to administer the activities of these three participants. The association also functions as the county school health council, and it administers the county program of indigent medical care.

In addition, the present membership of the Washington County Public Health Association represents the following agencies or groups: county hospital; county medical and dental societies; Red Cross; county ministerial association; PTA; county commissioners, and mayor and city council of Hagerstown, Md.; business groups such as the chamber of commerce and local manufacturers; and a lay group organized to assist public health nurses.

Contributions of Members

The county hospital's contribution is an important one. A private agency, it owns the building housing the health department. From there, each serves the other: the hospital staff assists in the clinics; health department emergencies are referred to the hospital; there is an interchange of records; and the hospital furnishes meeting rooms for health department personnel and staff meetings. Planning for closer coordination is even now under way, and in fields where there is a mutual community interest, the health department and the hospital collaborate. Some of these fields are laboratory, X-ray, library, visiting nursing, and clinics.

The Red Cross provides eyeglasses for those unable to purchase them. It has helped staff the clinics with its volunteer workers. Besides furnishing transportation to and from clinics, hospitals, and the medical center for special diagnostic and treatment service, the local chapter maintains for use by public health nurses a loan closet well-stocked with layettes, blankets, and sweaters. In addition to promoting a clean-up drive and programs for rodent control and housing, the chamber of commerce sponsored a mass X-ray survey which was partly financed by the tuberculosis association. The official agencies—City of Hagerstown, county commissioners, and the school board—have made cash donations and assisted in planning and administration.

The Washington County Ministerial Association assists in public health education. The PTA helps in planning school health demonstration programs and in establishing good relations between schools and health departments. Like the Red Cross, an organized lay group, whose president is a member of the Washington County Public Health Association, furnishes transportation and volunteer service for the clinics.

Part of the salary of a physiotherapist on the health department staff is furnished by the Washington County chapter of the National Foundation for Infantile Paralysis. The tuberculosis association pays the

fees of a clinician, an X-ray technician, and a clerk at the chest diagnostic clinics. The cancer society supports a cancer detection clinic, gives special services to cancer patients, and furnishes surgical dressings. Some services of physicians and dentists are given without charge and others at an entirely inadequate clinic fee.

As a result of this interchange of material things and services, the community has benefited by excellent public health relations—between the schools and the health departments, between the professional societies and the health departments; between the welfare program and the public health program; and between city administration and county administration. Most important, however, is the opportunity for all the interested agencies to plan together an over-all health program for the community. As a result, each group sees the total program and not just its specialized interests.

The Voluntary Agency

Citizen participation figured prominently in the formation of our local Mental Hygiene Society and Child Guidance Center. Responses to a questionnaire sent out in 1946 by a special committee of the Springfield Council of Social Agencies showed the public to be keenly interested in such a project. A board, which became the planning body and nucleus of the present Mental Hygiene Society, was therefore formed.

The function of the society is twofold: (1) to administer a mental health clinic, and (2) to conduct an educational program for prevention of mental illness.

Mental Health Clinic

The first job was to set up the clinic. After 2 years, we secured staff, funds, and a location. When

By Mrs. Lydia Dobbins, president, Mental Hygiene Society of Springfield (Illinois).

I tell you that funds, of a sort, came from the County Board of Supervisors, the local school board, and the Community Chest, you may know that considerable citizen effort was expended. We later qualified for Federal money.

An open house announced our existence. Welcoming committees made up of State and local public health officials, prominent doctors, nurses, PTA presidents, and school officials were on hand to explain our role in the community. About 250 citizens attended and many of them became members of the society.

We were fortunate in securing as executive secretary of the society a psychiatric social worker of wide experience who administered the clinic sympathetically and set high standards for the committees. Good leadership is necessary if full citizen participation is to be secured.

School Programs

For 3 years we focused our attention on the PTA, a ready-made, highly motivated group. By the end of the first year, we had a mental health chairman in each of our 30 school PTAs; had given at least one program on mental health in 25 schools; had conducted study classes with parents in four schools; and

had set up a series of lively panel discussions between parents and children in one of our three high schools. At the end of the school year, we climaxed this work with an institute for parents and teachers, securing a psychologist from the University of Chicago as lecturer and discussion leader on the topic, "What should a child expect from his parents?"

The psychologist also met with the leading school people of the city and interested them in the study group project idea. Consequently, for the past 2 years, 11 study classes of mothers, some fathers, and teachers have been held. I am sure this child growth and development study project has given "Ma" and "Pa" a better understanding of what makes Johnny tick, as well as bridging the gulf between the home and the school. The Mental Hygiene Society has furnished leaders and moral support for this venture.

We feel that certain recent improvements in school procedure have a definite relationship to this new interest in wanting to understand Johnny. This year, report cards in the elementary schools have been replaced by teacher-parent interviews and chart evaluations of progress and personality development.

High school counselors now visit the home of every freshman. Truancy and the causes for leaving school are being studied.

Another point of contact we have labored with has been the county court. Our testing and psychiatric services are available for every child who comes within its jurisdiction as a dependent or delinquent. Also, as a result of the insistent recommendations of the Mental Hygiene Society, a psychiatrist now sits on the Sangamon County Commitment Board.

National Mental Health Week

Perhaps our most concentrated effort to recruit citizen participation occurs each May, during National Mental Health Week. For the past 2 years we have sponsored a 1-day institute designed to create a wide general interest in problems of emotional maladjustment as they are related to the anxieties of childhood.

For this coming May, we are trying a different approach—seminars instead of institutes. By invitation, three small select study groups are being formed: one, of religious leaders (Sunday-school teachers); one, of employers and personnel men from industry; the third, parents. A psychologist, experienced in each field, will guide them.

Planning and Action Through State Health Councils

Five Case Reports

Virginia Council on Health



For a number of years prior to 1946, a self-appointed, widely representative committee on rural health made studies and published and circulated reports until people were considerably aroused because health services in the smaller communities were

gradually disappearing, with few replacements in prospect. Although medicine at the crossroads had been decreasing for years, many of the factors behind this trend were not generally recognized. That the number of doctors and hospital beds and the amount of hospital insurance had to be increased was agreed. Something akin to a ground swell was under way; more and better health services had to be provided.

Encouraged by the Virginia Tuberculosis Association, H. B. Mulholland, M.D., then president of the Medical Society of Virginia and a leader in State and national efforts for better rural health services,

called together in Richmond a representative group of agencies directly or indirectly concerned with health services.

Organization

This was in 1946, and that year the Virginia Council on Health and Medical Care was organized with 37 members, now grown to 52 statewide organizations and about 100 local units. The council is simply organized. Its constituent membership includes the State health department, Virginia Cancer Society, the Virginia Tuberculosis Association, the Office of the Commissioner of Mental Hygiene and Hospitals—

By William T. Sanger, Ph.D., chairman, Virginia Council on Health and Medical Care, and president, Medical College of Virginia.

organizations devoted solely to health—as well as organizations having certain health interests, like the Virginia Federation of Home Demonstration Clubs and service clubs. Local councils and other organizations have been found to be effective in carrying out projects in their communities.

A well-set-up health council affords its membership opportunities to learn the programs, interests, and problems of its member organizations. This is a recurring need and can be accomplished both by brief reports at meetings and by material circulated from headquarters or from council members directly.

Major Accomplishments

First, the council tackled a comprehensive legislative program, its effectiveness depending upon the education of the public. Bulletins were circulated by thousands. Many community meetings were addressed by selected speakers, and interested organizations worked through their memberships. For example, the Hill-Burton hospital construction program was given tremendous impetus and large State financial support in addition to that provided by the Federal Government and local communities. We are sure this would have been impossible otherwise. Furthermore, almost every other health interest has benefited by our legislative emphasis. The issuance of public opinion reports is now routine. The council assigns special tasks to constituent members. These tasks may call for legislative and educational work, or special studies.

One important council-directed study was a survey of the need for health service personnel. The study revealed that 33 counties (one-third of the State) lacked physicians and other health workers. A further task is to study these counties on a community basis to ascertain the cause of health service shortages, whether economic, social, educational, or religious. An earlier study dealt with practically all phases of rural health conditions.

Last fall, we sponsored a statewide conference on crippled children at the request of the Nemours

Foundation, Wilmington, Del. Many fundamental conclusions were reached at the 2-day program, including a decision to set up a coordinating committee for crippled children's work. That committee has now met and outlined a promising action program. Next fall, the conference on crippled children will be devoted to speech defects and their correction. Also, the Nemours Foundation has allocated \$45,000 for crippled children's work in Virginia with a prospect that such grants will be put on a continuing basis.

Cooperation with the State department of mental hygiene and hospitals and the Virginia Mental Hygiene Society has aroused interest in our mental hygiene clinics and institutions and resulted in substantial appropriations.

Future Programs

Continued emphasis will be given to mental health; to the better distribution of physicians and medical personnel; more hospital beds; special studies on the need and distribution of medical personnel; community health inventories; complete coverage of public health services; enriched and enlarged training opportunities for medical and related personnel; nutrition; crippled children; hospital and health insurance; and placement of physicians within the State.

The accomplishments of the Virginia Council have been next to phenomenal. Its flexible and broadly conceived potential for action fits it for attacking almost any issue with some guarantee of success. Its balance between professional and lay membership is undoubtedly one of its primary strengths.

Ohio Rural Health Council



The Ohio Rural Health Council originated in 1941, with the appointment of a committee to study the need for more adequate health services and facilities for rural areas. The member-

By Mrs. Arthur McCoy, vice president, Ohio Rural Health Council.

ship is now comprised of representatives from 22 state-wide organizations interested in the problem—including four State government departments, the Ohio State Medical Association, the Ohio Farm Bureau Federation, the State Grange, the Farmers' Home Administration, and the Agricultural Extension Service of the Ohio State University—and an equal number of area members, each representing four counties.

Five-Point Health Program

To acquaint the rural people with the health opportunities already available and to encourage expansion of rural public health activities, the council gradually developed the following five-point program:

1. Assembling and disseminating information to inform rural people of the health programs in operation.
2. Encouraging organizations and agencies to initiate programs of health education within their own organizations.
3. Holding State and district meetings to afford opportunities for lay and professional people to discuss health problems together.
4. Training leaders in rural areas to assume responsibilities in the promotion of health activities.
5. Encouraging counties to make surveys and studies to determine local health problems and needs.

Carrying Out Our Program

How are we succeeding in accomplishing these aims? In 1947, at the request of the cooperating agencies, the Agricultural Extension Service accepted the responsibility of employing and supervising an extension health specialist. State conferences have been held annually since 1944; a district conference held in 1947 proved so successful that two were held the following year, four in 1949, four in 1950, and eight last year. We are working toward the goal of annual meetings in each of the 22 districts.

As a result of the growing interest in better public health, the number of full-time health departments in the State is increasing and programs are being enlarged. Fifteen counties have organized active, voluntary

councils, which are enthusiastically working for better health programs and organizations. Two counties have conducted exhaustive surveys to determine local health conditions and have launched enlarged health programs.

Several of our cooperating organizations have set up special programs in the interest of better rural health. The Ohio State Medical Association, for example, now has a rural health committee—with a full-time worker—serving as a policy forming group within the organization and has initiated a system of scholarships to encourage rural medical practice. The Ohio Farm Bureau is promoting a program of health education among its members. The Ohio State Grange requires a minimum of two health programs yearly for its 800 subordinate granges. The Ohio Veterinary Medical Association, in cooperation with the Ohio Departments of Health and Agriculture, has prepared and distributed folders concerning animal diseases affecting man.

Although we feel that the Ohio Rural Health Council has made real progress during its short existence, we realize that we have only begun to prove what may be accomplished when organizations and agencies

work together toward a common goal. The opportunity to get together frequently, on both State and local levels, to consider health problems and to evolve methods whereby all may work together, harmoniously and understandingly, is the key to true coordination of rural and professional groups. We of the Ohio Rural Health Council feel that we face great opportunities, and at the same time—through our growing knowledge of these problems—great responsibilities.

Pennsylvania Health Council

PHR
brief

If there is need for improved health in a community, state, or nation, there is need for a health council at that level. Everyone must admit there is always need to improve health, and I believe there is always need for a health council.

In initiating new health projects, health departments, medical, dental,

By Gilson Colby Engel, M.D., president, Pennsylvania Health Council, and professor of clinical surgery, Graduate School of Medicine, University of Pennsylvania.

and nursing societies, and voluntary health groups are usually their promoters. Obtaining public acceptance and support can be an important function of a health council. Through its diversified membership it can coordinate ideas, and through its wide public contacts it becomes a powerful factor in the education of the public and the legislators.

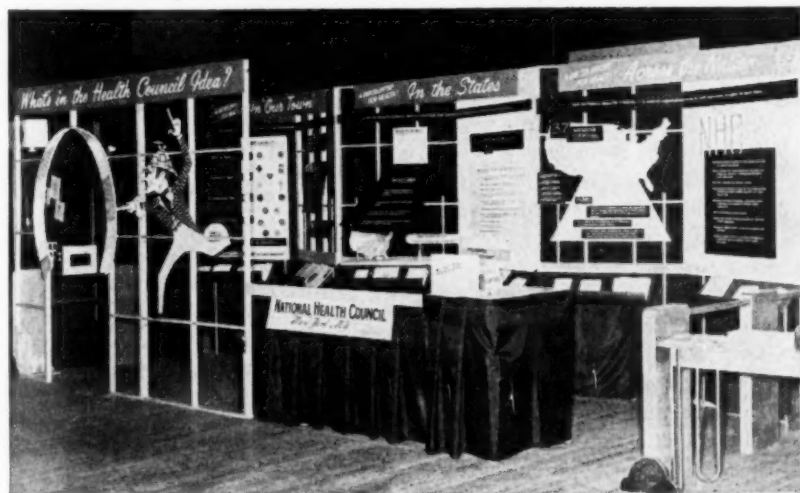
How We Grew

In Pennsylvania, the State medical society requested the governor to have a health survey made by the American Public Health Association. The survey report revealed many points calling for changes, some involving new legislation. It indicated the need for a health council. At the time, 1949, I was president of the State medical society, and I requested our committee on rural health to invite organizations to meet and discuss the possibility of forming a State health council. Delegates from 40 professional, Government, lay, and consumer groups interested in health attended and unanimously voted to organize the Pennsylvania Health Council.

A meeting for permanent organization was called for February 11, 1950, in Harrisburg. Thirty organizations were represented. Bylaws were unanimously adopted. The officers—president, two vice presidents, secretary, treasurer, and five members-at-large to the executive committee—were elected. Annual membership dues were set at \$25 for each organization.

Among the present membership totaling 43 organizations are: Association of the Junior Leagues of America (Region III); Pennsylvania Bureau of Rehabilitation; Hospital Association of Pennsylvania; League of Women Voters of Pennsylvania; Pennsylvania Association for the Blind; and Pennsylvania League for Planned Parenthood.

Between annual meetings the health council functions through a 14-member executive committee composed of its five officers, five elected members-at-large, and four committee chairmen. The committee meets bimonthly in Harrisburg to conduct the council's business.



The story of health councils throughout the United States is told graphically in this exhibit, shown at the National Health Council meeting in New York. The exhibit was shown originally at the 1951 meeting of the American Public Health Association in San Francisco, where this picture was taken.

What We've Achieved

Financing is a difficult problem. The \$25 dues, amounting to about \$1,000 annually, do not go far, but we feel we have accomplished a great deal on that annual income.

What has our infant organization accomplished in our short existence? What are we doing now?

1. We started a campaign which became a vigorous fight over neglect of the tuberculosis situation, with wide repercussions.

2. The council, through its president, was invited to confer with the governor-elect concerning a new Commonwealth secretary of health and to sit on a nominating committee for the new candidate. The recommendation was followed.

3. We cooperated with the law schools at Pittsburgh and Pennsylvania Universities in the drafting of health legislation creating a merit system and local public health units. We backed this legislation and urged our member organizations to campaign for its passage with the result that the bills became law on August 24, 1951.

4. We have backed new narcotic legislation which created more severe penalties for the dispenser.

5. We support the new secretary of health in the carrying out of the new laws and in the appointment of new trained health personnel.

6. We support drives of our member organizations.

7. We are stimulating interest in a health education program for employees of the health department.

Missouri State Health Council



The motivation for the creation of a Missouri State Health Council came from a number of sources. The primary force was a realization on the part of several of the official and nonofficial agencies that there existed no mechanism for easy discussion of the programs and policies

By Donald E. Pratt, chairman, Missouri Health Council, and executive secretary, Missouri Tuberculosis Association.

of the organizations. It was decided that the Committee on Rural Medical Service of the Missouri State Medical Association should take public leadership, with the immediate backing of the Missouri Farm Bureau and the Missouri Tuberculosis Association, in sponsoring a conference to discuss the problem. The conference resulted in the establishment of a state-wide health council which would "bring together state-wide organizations and agencies with a fundamental interest in health for discussion, planning, debate, and interchange of opinions; to serve as a clearinghouse on health problems and programs; to facilitate joint planning in order to encourage coordination and effort on State and local levels."

Objectives of the Council

The health council determined three main objectives: (1) self-education of its membership as to the program and policies of its constituents; (2) furtherance of local health councils, whose primary purpose was to survey their areas for a determination of health needs; and (3) furtherance of county health units under either one of two enabling acts.

Under the leadership of the bureau of health education of the division of health, the Missouri Farm Bureau, and the Missouri Tuberculosis Association, some 50 county health councils have been established, and 15 new county health units brought into existence.

The Missouri State Health Council is not an action group but rather a discussion group. It is financed by \$10 annual dues from state-wide member organizations. The community health councils, as associate members, do not contribute to its support. Since there is no salaried staff, the State council works principally through its member organizations and their staffs.

The State council has acted as a citizens committee for an American Public Health Association survey of the State division of health, and has sponsored annual public meetings, which have been attended by as many as four and five hundred peo-

ple. Council meetings are held quarterly, and meetings of the executive committee, more frequently.

Currently the council is engaged in the first coordinated state-wide investigation of the problem of the hospitalization of the indigent ill. It is also preparing materials for assisting local councils.

Michigan Health Council



The Michigan Health Council is organized along the lines of the National Health Council, with a membership of 26 state-wide organizations. It spends about \$20,000 a year.

Our major field of activity is in assisting community health councils. We believe that the health problems of Michigan and of America will not be solved unless they are solved on the local community level. We do not enter any community, however, unless we are invited to do so by a local group. We have discovered by experience that community organization can be assisted and nurtured by state-level stimulation, but the desire for better health and the will to take necessary steps to achieve it must reside in the community. We assist the local health councils by helping them to organize, advising them on long-term and short-term objectives, conducting State and regional meetings for exchange of information, and publishing a monthly bulletin for the same purpose.

Local Aid

Although each community health council determines its own objectives, we try to advise against attempting too much the first year. A combination of a short-range objective, which can be reached in a year, and a long-range objective, which will provide continuing reason for existence, seems to constitute the best formula for our community health councils.

By John S. DeTar, M.D., president, Michigan Health Council, and past president, Washtenaw County Medical Society.

Some of our community health councils (we have 32 organized now) are old; some are new. Both the long-range objectives and the current projects of these community health councils vary in accordance with local needs. This divergence in activities stands out as a conclusive argument for the need of action on the community level, as contrasted with determination of need from a centralized national headquarters.

Some of the projects of these community health councils are:

1. Self-survey on health of an entire county of 46,000 rural people to determine objectives for county health council.
2. Immunization program.
3. Campaign for enrollment in prepaid hospitalization and medical insurance program.
4. Weekly health column in newspapers.

5. Regional conference of community health councils for exchange of information.

6. Formation of a blood bank (rural).

7. Educational programs in small towns.

8. Topical fluoride dental program among school children.

9. Formation of county health department.

State-Wide Projects

The Michigan Health Council presents awards each year to outstanding community health councils, and to newspapers and magazines for meritorious work in the health field.

We hold an annual rural health conference in Michigan—with 94 co-sponsors. We publish annually a directory of all Michigan health organizations.

We have made a film depicting the steps in organizing a community health council, which will be avail-

able for other State health councils for use in their States. We also operate a film information service for assistance of community councils.

Our members are working on the development of a "periodic health appraisal" to replace the annual examination for cancer, heart, diabetes, tuberculosis, and other diseases. This is a type of cooperative effort possible on the State level.

We plan to hire a full-time field secretary to work with the community councils, and a full-time man to work exclusively with high school students in assisting them in choosing a career—with the attempt to guide them into the fields of medicine and associated activities, which so sorely need them.

Our only handicap is lack of money.

We believe a State health council fills a need which no one other organization can quite fill.

New Chief of Division of Commissioned Officers

Dr. Erwin C. Drescher has been appointed chief of the Public Health Service's Division of Commissioned Officers. He succeeds Dr. Eugene A. Gillis, who has been assigned as consultant to the Lebanese Government. During his 17-year career in the Regular Corps of the Public Health Service, Dr. Drescher has served as deputy State health officer of Oregon, director of venereal disease control and assistant State epidemiologist in Kentucky, and chief of medical services in Public Health Service District No. 1. Before coming to Washington in 1951 as operations officer of the Division of Commissioned Officers, he was Public Health Service consultant to the City of Pittsburgh.

Dr. Drescher is a graduate of the University of Michigan and of the University of Michigan School of Medicine and holds the degree of master of public health from The Johns Hopkins University.

Unstained Slides for the Diagnosis of Certain Treponematoses

By WALDEMAR E. COUTTS, M.D.,
EDNA SILVA-INZUNA, and
GUILLERMO MORALES-SILVA

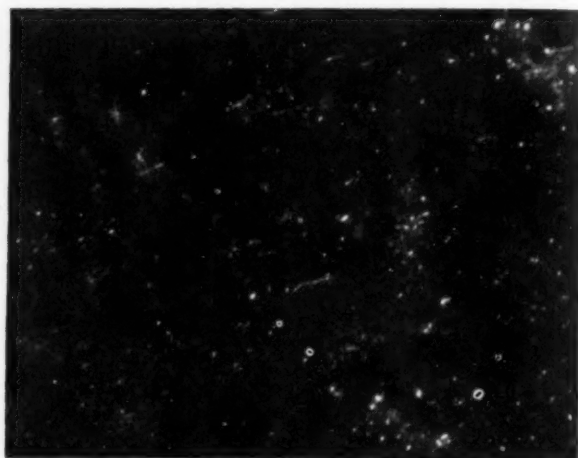
The procedure and techniques we describe may be helpful in diagnosing treponemal or spirochetoidal infections in localities where a microscope is not available or, if available, lacks a condenser for dark-ground illumination.

Before communicating our results, we examined slides from *Treponema pallidum* lesions sent to us from different regions of our territory, which extends from parallels 18 to 56, and others coming from different countries and containing material from open lesions produced by other treponemata than *pallida*.

Slides to be sent to the laboratory can be dried at room temperature without previous fixing with any substance; they may be fixed with ether-alcohol or, preferably, a 10-percent formalin solution. A slide or a piece of window glass containing a thick coating of dried material can be sent by ordinary mail or by air mail, wrapped in common or filter paper. After this material is received in the laboratory it is mixed with tepid normosalt on the same slide or glass; thin films are laid on unscratched glass, fixed with 10-percent formol, rinsed in tap water, and dried over a low flame.

Dark-ground observation of the slide can be made with a powerful lens or under double immersion. Under dark-ground illumination, spiral micro-organisms appear as brilliant as when seen in fresh material, only they are motionless. Epithelial cells, leukocytes, and red blood corpuscles also preserve their shape and

characteristics. The bodies of treponemata appear as a succession of brilliant dots, varying in number from 4 to 16 or more, sometimes linear, at other times slightly curved in appearance. Spirochetoidea, on the contrary, show their bodies as a continuous, flexuous, worm-like unit, tapering towards its extremities. Curves are more open and fewer in number.



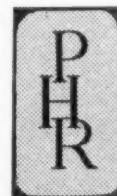
Dark-ground illumination of fixed unstained slides for the diagnosis of certain treponematoses. A sample of what can be obtained with a 6L (Leitz) lens and a No. 10 (Zeiss) photo-ocular lens.

Fuchsin-stained preparations of material containing treponemata or spirochetoidea can also be observed under dark-ground illumination; spirochetoidea appear brilliant and colored, treponemata appear brilliant, slightly colored, or, more commonly, unstained.

ACKNOWLEDGMENTS

The authors wish to acknowledge the kindness of the Pan American Sanitary Bureau (WHO for the Americas) and especially of its Director, Dr. Fred L. Soper, and that of Lieutenant (SS) Gérard Boyer, of Haiti, in making available slides containing yaws material.

Dr. Coutts and co-authors are with the Department of Social Hygiene, Chile Public Health Service.



Shattuck, Chadwick, and the Engineer In Public Health

By GORDON M. FAIR, Dr. Ing.

In the now remote spring of 1850, there fell from the hands of the State printer of the Commonwealth of Massachusetts in North America a "Report of a General Plan for the Promotion of Public and Personal Health." The recommendations contained in this report were eventually to become the charter of public health in America. Among them were recommendations that set the example for the participation of engineers in developing the public health policy of the country.

The principal author of this report was Lemuel Shattuck, a Boston bookseller, teacher, and public servant, who had written its more than 500 pages in slightly less than a year. This he had done, furthermore, with the expenditure of but \$500. However, Shattuck could never have accomplished this task had he not been able to "drink deeply from the Pierian spring" that welled through the writings and reports of Sir Edwin Chadwick. Sir Edwin he acknowledged to be "the individual to whom, perhaps more than any other, the cause [of sanitary welfare and improvement of the people] was indebted" (1).

The substance of Shattuck's document was contained in 50 recommendations, 36 of which,

according to an analysis by Winslow (2) in 1949, are now "universally accepted practice"; but 4 are "unimportant or, in some degree, unsound"; and 10 although "as sound as the 36 proposals that have been generally accepted" were sufficiently advanced in their objectives that "their importance has as yet not been fully recognized."

The Need for Engineers

Among the half-hundred measures that Shattuck proposed was the creation of a general board of health composed, so far as practicable, "of two physicians, one counselor-at-law, one chemist or natural philosopher, one civil engineer, and two persons of other professions or occupations; all properly qualified by their talents, their education, their experience, and their wisdom" (1). Two reasons were given why the members of the board should not be selected exclusively from one profession. In the first place, Shattuck anticipated that "numerous questions requiring a knowledge possessed by different professions" would be presented to the board of health "for discussion and decision." Second, the promotion of public health, in Shattuck's mind, was a matter that concerned "every profession and every person." The services of medical men he rightly considered "indispensable, but the services of other professions, and of every person in their respective spheres," he was convinced, "must be put in requisition before reform can [could] be complete." According to Shattuck "the idea which too generally prevails, that

Professor Fair is Abbott and James Lawrence professor of engineering and Gordon McKay professor of sanitary engineering, Harvard University. This paper is based upon material presented in a Chadwick Public Lecture delivered at the Royal Sanitary Institute, London, in June 1950.

everything relating to health belongs exclusively to one profession, operated against sanitary improvement."

The civil engineer member of the board, Shattuck suggested, should possess "competent knowledge to determine the best methods of planning and constructing public works, and the best architectural sanitary arrangements of public buildings, workshops, and private dwelling houses." Possession of such competence, Shattuck was convinced, would make the engineer an exceedingly valuable member of the board, and so he has proved to be.

The enunciation of the principle that engineers should have a part in public health had been anticipated by Sir Edwin Chadwick, who, in 1842, had suggested:

That for the protection of the laboring classes and of the rate payers against inefficiency and waste in all new structural arrangements of the protection of the public health, and to insure public confidence that the expenditure will be beneficial, securities be taken that all new local public works are devised and conducted by responsible officers qualified by the possession of the science and skill of civil engineers (3).

The minds of Chadwick and Shattuck, as the minds of great men so often do, moving in much the same channels, therefore, appear to have assured the early participation of engineers in the public health work of their respective countries, but for each in its own way. In the older civilization of Britain, participation has during this past century of public health progress been confined perhaps more narrowly to the economic design of sanitary works as a peripheral contribution of the engineer to public health. In the more fluid civilization of America, engineering participation has been afforded somewhat wider scope in the formulation of public health policy and in its implementation. In this sense, perhaps, the American engineer has moved closer to the central core of public health, greatly to its ultimate advantage.

The Great Sanitary Awakening

That we may establish a base line for the accomplishments of the last century, let us turn to a few examples of on-the-spot reporting of sanitary conditions in the mid-nineteenth century and adjacent decades.

Lagging behind the renaissance in arts and letters, the scientific renaissance had begun to flower in the eighteenth century. An opportunity had been afforded thereby for its fusion with the spirit of humanitarianism which pervaded the end of the eighteenth and beginning of the nineteenth century in Britain. There resulted the great sanitary awakening that swept over the emergent democracies of the world.

The great sanitary awakening is associated, in particular, with the growth of cities, which was a necessary element of the industrial revolution. Scientific discoveries and engineering inventions had created centralized industries. To these, people flocked for employment. On the whole, this was a good thing. Certainly it advanced the standard of living of vast numbers of men. But absence of restrictive legislation soon led to the exploitation of labor, and absence of community organization created slums. Through these slums the apocalyptic horsemen of pestilence and death often rode their steeds unchecked.

The community facilities of the mushrooming industrial cities were generally overtaxed. In particular, the need for the abundant distribution of safe water, for the effective disposal of human wastes, and for the decent housing of swelling tides of humanity could not be met. The means and knowledge to cope with this new situation were not immediately at hand. Too often water was drawn from polluted rivers or from shallow wells in crowded sections of the community. It was then "distributed in courts by standpipes on intermittent days. The fatigue of fetching it was so great that they (the inhabitants of the courts) only used it for purposes which they deemed of absolute necessity, such as cooking; they rarely bestowed much of it on their clothes or persons" (4).

A single quotation from the report of the Poor Law Commissioners (3) gives a picture of housing conditions and of the need for sanitary sewerage in Britain a hundred years ago.

Many dwellings of the poor are arranged "round narrow courts having no other opening to the main street than a narrow covered passage. In these courts there were several occupants, each of whom has accumulated a heap. In some cases, each of these heaps is piled up separately in the court, with a general

receptacle in the middle for the drainage. In others, a pit is dug in the middle of the court for the general use of all the occupants. In some the whole courts up to the very doors of the houses are covered with filth. Around this mass, the cottages of the residents are arranged, having no back outlet, no back windows, or other means of ventilation. The windows and doors of the houses open and look towards this mass; and all the air supplied to the inmates is obtained through these doors and windows. The residents were very frequently subject to fever, and were always regarded as the first to be affected by any epidemic disease.

To remedy conditions such as these, the discharge of human wastes into existing storm drains was permitted at the beginning of the nineteenth century. The system of combined sewerage was thereby initiated, and the earlier drainage works of most metropolitan communities were subsequently developed in accordance with this scheme. Terminating in nearby water courses, the drains discharged quantities of waste materials that more often than not overtaxed the receiving capacity of these waters. The nuisances that had apparently been so happily removed from dwellings by water carriage were then concentrated along the streams.

Rain to River, Sewage to Soil

First the smaller ones and then the larger water courses began to "seeth and ferment . . . in Augean foulness." As a remedy, many of the smaller streams were, therefore, converted into sewers; but the larger bodies of water had to remain open to view and other sensory disapprobation. I shall spare you a description of the Thames in the hot summers of 1858 and 1859 as recorded by Dr. Budd in his classical treatise on "Typhoid Fever, Its Nature, Mode of Spreading, and Prevention," and shall only recall the rhyme of Samuel Taylor Coleridge about the city of Cologne, which he visited about 1798.

"The river Rhine, it is well known,
Doth wash your city of Cologne;
But tell me nymphs! What power divine
Shall henceforth wash the river Rhine?"

Engineers would have done well to heed as early as 1847 the earnest recommendations of Sir Edwin Chadwick (5) for the introduction of the separate system of drainage whereby the storm flows would have reached the water courses unaffected by the wastes from habita-

tions and industries, while the sanitary flows would have been led away in much smaller conduits to a point where they could be disposed of without nuisance, if need be, after suitable treatment. "The rainfall to the river and the sewage to the soil" was the phrase that epitomized the Chadwick doctrine.

In spite of such admonition and that of Chadwick's great engineering associate, Sir Robert Rawlinson, municipalities continued, on the grounds of expediency and short-range economy, to elaborate their storm-drainage systems into combined sewerage works, greatly to the disadvantage of ultimate amenities in the city plan. Even the capital city of Paris, which did not complete its sewerage until many years later, failed to take advantage of the hygienically and esthetically more desirable separation of sanitary and storm flows. Although Paris did not adopt the separate scheme, Sir Edwin Chadwick may well have promoted the speedier institution of sewerage in that city by his suggestion to Napoleon III in the winter of 1865-66 which is recorded by B. W. Richardson (6) as follows:

Sire, they say that Augustus found Rome a city of brick, and left it a city of marble. If your Majesty, finding Paris fair above, will leave it sweet below, you will more than rival the first Emperor of Rome.

It is evident from these descriptions that the foremost public health needs of the mid-nineteenth century were for adequate and pure water supplies, and for the safe removal of wastes from human habitations. These matters became the responsibility of civil engineers who were experienced in hydraulics. Sir Robert Rawlinson was in his day probably the leading practitioner in this field. But there were many others, particularly in Britain, among whom was John Roe. It was he who accepted Sir Edwin Chadwick's suggestion that vitrified tile pipe be used in sewer lines. In his report to the Harrow local board of health of 1854, Roe said:

The introduction of stoneware pipes for general drainage arose from a suggestion made by Mr. Chadwick to me, in his desire to obtain smooth interior surface; and the first sewer pipes made for that purpose in the metropolis were for the Holborn and Finsbury office.

It is understandable, therefore, that Sir Robert Rawlinson should have dedicated his Lectures,

Reports, Letters, and Papers on Sanitary Questions (1876) "To Edwin Chadwick, Esq., C. B., as the Chief Promoter of Modern Sanitary Works and Appliances."

The Scientific Foundation

Although James Simpson had introduced the principle of sand filtration as early as 1829, in order to purify the waters gathered from the Thames by the Chelsea Water Co., and although Dr. John Snow had demonstrated by 1849 that fecal pollution of drinking water was a major factor in the dissemination of cholera, these were judgments, as it were, *ex pede Herculem*. Public health, and with it public health engineering, had to await the discoveries of Louis Pasteur before the full body of knowledge and the measures of sanitary accomplishment could become available. Thenceforward, the engineering objectives as well as the means for attaining them became clear.

Filtration for the sake of improving the palatability of water was tied to the more important use of filtration for the prevention of enteric disease. Sewerage for the purpose of avoiding nuisance was made ancillary to waste disposal for the safeguarding of water supplies, bathing places, and useful aquatic life. Sewage treatment for the utilization of the fertilizing ingredients of municipal sewage as well as its water value was made subservient to suppression of an ever-growing list of intestinal infections. In the course of time the *Index Expurgatorius* included, among causative agents, not only bacteria but also protozoa, worms of many kinds, and finally viruses.

In America, the need for sanitary reform led to the establishment, in 1886, of an engineering department in the Massachusetts State Board of Health. This department was given the responsibility to protect the purity of inland waters. By allying to itself not only engineers but also chemists and biologists and by meeting its responsibilities in a spirit of research and investigation, this department established itself firmly in public health service.

Today, no State or Territory of the United States is without its public health engineering organization; neither are the United States Public Health Service, the four medical depart-

ments of the Armed Forces and the Veterans Administration, the Atomic Energy Commission, and the Tennessee Valley Authority. Engineers sit on the committees of the National Research Council and are attached to the headquarters staff of the American National Red Cross. Engineers have been directors of the health and sanitation effort of the Institute of Inter-American Affairs, and an American engineer heads the environmental sanitation division of the World Health Organization.

The Chemist and Natural Philosopher

A word should be interpolated here about the chemist or natural philosopher whom Shattuck included in his proposed board of health. This member of the board, according to Shattuck, would have to answer many questions and make special investigations "relating to the influence of the elements on the production or prevention of disease." It is the happy alliance of the chemist, the biologist, and the engineer with the medical profession that has, in large measure, accounted for the progress that has been accomplished in the promotion of the public health by sanitation of the environment. Chemists and biologists have, indeed, had to answer many questions of fundamental scientific importance, and they have had to make many special investigations. Without these, it is only fair to say that the works of the engineer and their management would often have been ill-conceived and inadequate in performance.

The presence of hydraulic engineers in health departments led medical officers of health to seek their advice first of all in matters related to water, such as water supply, sewerage, the sanitation of swimming pools and other bathing places, the control of shellfish-laying areas, and, in certain parts of the country, the control of malaria and other insect-borne diseases in which the insect vectors can be attacked in their aquatic habitat by hydraulic and related operations.

Sanitation of the Environment

In the course of time, the familiarity of public health engineers with the control of en-

vironmental factors that were implicated in the spread of disease made them available to assist in the solution of numerous additional problems. Among them are the following: (a) the sanitation of the air both in and out of doors, in habitations and workshops, in airplanes and in vehicular tunnels; (b) the sanitation of food, in particular of milk during production, conditioning, storage, preparation, and distribution; (c) the disposal of solid municipal wastes, especially food wastes; (d) the control of animal and insect vectors of disease with special reference to their presence in dwellings and other structures; (e) the control of noise; and (f) the provision of adequate light. Many of these environmental factors are implicated in one way or another in the complex problems of housing, industrial hygiene, school sanitation, and town planning.

Given a high place in the formulation of public health policy and the development of measures for the preservation and promotion of public health, engineers have, however, not only been called upon to advise communities and private organizations and individuals about sanitary measures and needs. They have also been asked to give voice, in the halls of parliaments, to the public health requirements of municipalities and rural areas. They have, within public health bodies, been required to exercise such measure of police power as has been needed to enforce sanitary regulations. They have been instrumental in arousing public interest in sanitary progress. They have been put in charge of researches that have advanced the art and science of sanitation. They have become part of the public health team assigned to the suppression of sudden outbreaks of disease. Finally, they have been mobilized in time of disaster and war to coordinate the management of emergency and military sanitation.

Sanitation of the environment is indeed peculiarly a responsibility of the engineer, because his profession, more than any other, is fitted to direct the use of men, money, and materials to the purpose of securing the prosperity and well-being of mankind. The environment of modern man has, in fact, been created in large measure by the exercise of engineering skills. What has been asked of the engineer,

therefore, in a material sense is that he hold in check, as well as apply, the fire which his protagonist Prometheus wrested from the gods.

Organization for Engineering

The Massachusetts Department of Public Health, which grew out of the recommendations of the Shattuck Report of 1850, stands as a leading example of governmental organization for the protection and promotion of the public health through engineering activities. In 1952, this department was serving a population of about 4.5 millions, including the large metropolitan area of Boston. It is directed by a commissioner of health who has the advice of a public health council and the aid of three deputy commissioners.

The third deputy commissioner is an engineer. He is director of the bureau of environmental sanitation. He is also the chief engineer of the division of sanitary engineering and supervises the division of food and drugs.

The division of sanitary engineering is concerned with water supply and water pollution control, with sanitary works at State institutions, with hydrology and hydrography, with housing and plumbing, with camps and other shelters, with offensive trades and nuisances, with cemeteries and mausoleums, and with shellfish sanitation. The division staff includes 26 engineers, 14 chemists, 2 bacteriologists, 2 biologists, 6 sanitarians, 1 supervisor of public health information, and 28 assistants and clerks. It includes a central analytic laboratory, a district analytic laboratory, and the well-known Lawrence Experiment Station.

The division of food and drugs is directed by a chemist. Its responsibilities include veterinary food inspection, other food inspections, and inspection of bedding and upholstery. Drugs are controlled through the food and drug laboratories. Since the sanitation of food is so much a matter of education of the workers in food industries and of food handlers of all kinds, a coordinator of environmental sanitation cooperates with the division of food and drugs. He is directly responsible to the chief sanitary engineer. His duties extend also to cooperation with the division of occupational hygiene of the Department of Labor and In-

dustries. The division of food and drugs comprises 2 veterinarians, 9 chemists, 2 bacteriologists, 15 food and drug inspectors, and 13 assistants and clerks.

In Massachusetts, the division of occupational hygiene is attached to the department of labor and industries rather than to the department of health. Environmental sanitation being an important part of occupational hygiene, however, there is cooperation between the two departments of State government through the chief sanitary engineer. The division of occupational hygiene is directed by a physician, and includes a laboratory. The personnel of the division includes 1 physician, 2 engineers, 4 chemists, 2 nurses, and 5 assistants and clerks.

The Massachusetts pattern of engineering organization for public health is repeated in many other States and to some degree in the organization of the Public Health Service. In the latter, the chief engineer bears the title of Assistant Surgeon General. This is descriptive of the historical origin of the Public Health Service in the Marine Hospital Service rather than of the functions assigned to the chief engineer, which are engineering in nature.

Accomplishments—Direct and Indirect

Many of the contributions of engineering to public health cannot be measured by statistics of morbidity and mortality, for they are allied more closely to the enhancement of human comfort and well-being than to the direct prevention of disease and death. There is, however, clear evidence of the accomplishments of the engineer in public health in terms of reduced morbidity and mortality.

Historically, for example, the control of the water-borne enteric infections became the first concern of engineers associated with the new public health movement. In Massachusetts, deaths to the number of 1,333 were ascribed to typhoid fever in 1870, when the population of the State was 1.5 millions, and but 13, in 1937, when the population was almost three times as great.

Typhoid fever and diarrhea and enteritis in infants present another primary illustration. In Pittsburgh, prior to 1907, when the Alle-

gheny River water supply for the city was first subjected to filtration, the annual typhoid fever death rate had stayed close to 120 per 100,000 population. Filtration was responsible for a dramatic drop of almost a hundred points. Chlorination subsequently eliminated the water supply as a source of typhoid fever, and pasteurization of the milk supply of the community undoubtedly contributed to the decline in this enteric disease. The principal contribution, however, was in the slow but sure elimination of diarrhea and enteritis as an important cause of death of infants and young children.

Accomplishments in magnitude similar to those cited for the enteric infections could be shown for the reduction of malaria, murine typhus, and silicosis, and for yellow fever and other mosquito-borne diseases, for hookworm disease, for food-borne epidemics, and for numerous industrial hazards.

What of the Future?

The record of the past inevitably invites us to "look upon the seeds of Time and say which grains will grow and which will not." Although engineers do not lay claim to the gift of prophecy, they are, by force of circumstance, called upon to look into the future in order that their works may meet not only contemporary needs but that these works may serve well for many years to come. The normal period of design for some of the great structures that serve the sanitary requirements of communities may well reach a half-century. It is in the forecast of the future that the soundness of engineering judgments is, therefore, often tested.

The population of the world doubled during the nineteenth century under the impact of the industrial revolution, the speeding of communication, the intensification of agriculture, the discovery of new sources of energy, and the improvement in public health. It may well treble or quadruple within our own century. The sanitary competition for the elements of human existence will thereby grow steadily more intense.

Although we have learned how to put the fresh waters of the earth to use for multiple purposes, we shall have to become ever more jealous of them, and husband them more care-

fully both as to quantity and quality. In spite of our great investment in drainage schemes, we must be ready to replan our cities not only for better surface amenities but also for that "sweet below" for which Sir Edwin asked Napoleon III. We shall have to combine the recreational use of water with its sanitary protection. In all of this we must not fail to acknowledge that progress in the control of water-borne diseases imposes upon us ever greater caution, for we are constantly raising the level of nonimmunity of our people.

The lowering of the ground-water table and the encroachment of the sea upon our subsurface waters makes for anxious thought. We must learn to conserve this important source of water. There are many places in the world where we may even have to turn brackish waters into sweet. The progress in ion-exchange methods for this purpose is most encouraging, but the possible use of solar energy for the production of fresh water must not be overlooked. We are learning to become rainmakers, and the greater comprehension of micrometeorology that is needed to this end may help us also to place under our command the movements of the atmosphere above great industrial cities.

Air cleanliness is becoming an ever greater challenge. In areas of great atmospheric stability the growing pollution of the atmosphere is, in fact, reaching frightening proportions. There must be no more Donoras. Neither must great cities be permitted to be blanketed by smog, which shuts out sunlight, deprives us of beneficent radiations, and reduces the standard of attainable cleanliness.

Although we know how to disinfect air, the great mobility and communality of this element makes the control of airborne, droplet-borne, and dust-borne infections very difficult. Were it not for the chemotherapeutic agents and antibiotics, our record of respiratory infections would be far less satisfying than it is.

Marvels have been accomplished in the preservation of food, in its sanitary production, storage, transportation, and distribution. Yet

the number of food-borne epidemics remains extraordinarily high. From 1923 to 1945, for example, milk alone was responsible for almost a thousand recorded outbreaks of a variety of diseases affecting more than 40,000 people in the United States, a country that prides itself in particular on the sanitary quality of its milk supply. At that, many outbreaks undoubtedly were not reported. Education of the public in health will be found essential to the suppression of such occurrences.

Healthful housing remains one of the great challenges of the future. Solar heating of water and of dwellings may well come into use within our time.

It is true, finally, that the boon of sanitation has so far been vouchsafed to but a small fraction of the peoples of the world. As Wycliffe Rose, director of the Rockefeller Sanitary Commission which was to become the International Health Division of the Rockefeller Foundation, insisted, "Unless public health is conceived in international terms, the strategic opportunity of our generation will be lost."

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Industrial Sickness Absenteeism

By W. M. GAFAFER, D.Sc.

First Two Quarters, 1951

A seasonal trend is recognizable in industrial absenteeism for the first two quarters of 1951.

The over-all rate for the winter months (1951's first quarter) is 168.4 absences per 1,000 male workers, representing a 20-percent increase over the 1:50 rate of 130.4 for the same period. Contributing to the rise is a 47-percent increase in the rate for

the respiratory group, with influenza and gripe the leading cause.

In warmer weather, absentee rates drop. There is more similarity between 1951 and 1950 second-quarter rates. Of interest again are influenza and gripe with the 1951 second-quarter rate one-third less than the first quarter.

A review of the respiratory group of diseases by corresponding quarters for 10 years, 1942-51, shows the 1951 first-quarter rate 15 percent above its 10-year mean and the second-quarter rate 8 percent below its mean.

The tabular data below, on 8-day or longer disabilities, cover approximately 170,000 male workers in in-

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dustries and are based on periodic reports from industrial sick benefit associations, company relief departments, and group health insurance plans.

Absences per 1,000 male employees by cause (annual basis)—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—first and second quarters, 1951¹

Cause ¹	Number of absences per 1,000 males beginning in specified period						
	Second quarter		First quarter		First half		
	1951	1950	1951	1950	1951	1950	1946-50
Sickness and nonindustrial injuries...	118.2	125.7	168.4	130.4	143.0	128.0	119.0
Nonindustrial injuries (169-195).....	14.3	15.4	15.5	11.4	14.9	13.3	12.1
Sickness.....	103.9	110.3	152.9	119.0	128.1	114.7	106.9
Respiratory diseases.....	33.6	36.2	78.4	53.2	55.8	44.8	42.4
Tuberculosis of respiratory system (13).....	.5	.7	.8	.5	.7	.6	.7
Influenza, gripe (33).....	12.2	12.0	39.7	20.5	25.8	16.3	16.8
Bronchitis, acute and chronic (106).....	4.4	6.2	10.1	8.4	7.2	7.3	6.4
Pneumonia, all forms (107-109).....	4.9	5.6	10.5	8.0	7.7	6.8	5.1
Diseases of pharynx and tonsils (115b, 115c).....	3.9	3.7	4.3	3.3	4.1	3.5	4.2
Other respiratory diseases (104, 105, 110-114).....	7.7	8.0	13.0	12.5	10.3	10.3	9.2
Digestive diseases.....	21.3	21.6	21.9	18.0	21.6	19.8	17.7
Diseases of stomach except cancer (117, 118).....	6.6	5.9	7.0	5.8	6.7	5.8	5.5
Diarrhea and enteritis (120).....	2.4	2.8	2.9	2.7	2.7	2.7	2.2
Appendicitis (121).....	4.6	4.3	4.6	3.2	4.6	3.8	3.6
Hernia (122a).....	3.3	3.8	3.0	2.6	3.2	3.2	2.8
Other digestive (115a, 115d, 116, 122b-129).....	4.4	4.8	4.4	3.7	4.4	4.3	3.6
Nonrespiratory-nondigestive diseases.....	45.7	48.3	49.4	44.3	47.5	46.3	43.2
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31-32, 34-44) ²	3.4	3.3	5.3	3.8	4.4	3.6	3.2
Rheumatism, acute and chronic (58, 59).....	3.1	4.0	4.3	3.8	3.7	3.9	4.5
Neurasthenia and the like (part of 84d).....	1.8	1.9	1.3	1.3	1.5	1.6	1.8
Neuralgia, neuritis, sciatica (87b).....	2.2	2.2	2.2	2.0	2.2	2.1	2.6
Other diseases of nervous system (80-85, 87, except part of 84d and 87b).....	1.9	2.3	2.1	2.4	2.0	2.3	1.8
Diseases of heart and arteries, and nephritis (90-99, 102, 130-132).....	7.6	8.8	8.6	8.6	8.1	8.7	7.7
Other genitourinary diseases (133-138).....	4.7	4.6	4.9	4.0	4.8	4.3	3.3
Diseases of skin (151-153).....	3.3	3.2	3.3	2.8	3.3	3.0	3.2
Diseases of organs of movement except diseases of joints (156b).....	3.1	3.4	3.6	3.0	3.3	3.2	3.2
All other diseases (45-57, 60-79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162).....	14.6	14.6	13.8	12.6	14.2	13.6	11.9
Ill-defined and unknown causes (200).....	3.3	4.2	3.2	3.5	3.2	3.8	3.6
Average number of males.....	168,458	154,133	166,718	159,154	167,588	156,644	945,365

¹ Industrial injuries and venereal diseases are not included. ² Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939. ³ Exclusive of influenza and gripe, respiratory tuberculosis, and venereal diseases.

Insecticides and World Health

WHO Expert Committee on Insecticides

By SAMUEL W. SIMMONS, Ph.D.

The World Health Organization is a specialized agency of the United Nations and represents the culmination of efforts to establish a single intergovernmental health agency. It is the first intergovernmental institution to adopt the term "world" as part of its title. Disease knows no frontiers, and anything less than world action not only may deprive one nation of the benefits of WHO but may endanger the health of all member states.

WHO had its origin in the proposal, made at the United Nations Conference held in San Francisco in 1945, that a specialized agency be created to deal with all matters relating to health. In 1946, representatives of 61 governments met at the International Health Conference in New York, where they drafted and signed the WHO constitution and established an Interim Commission to serve until the constitution could be ratified by 26 member states of the United Nations. The constitution came into force on April 7, 1948; the First World Health Assembly met in Geneva in June 1948; and on September 1, 1948, the permanent organization was established.

The work of WHO is carried out by three organs: (1) the World Health Assembly, the supreme authority, to which all member states send delegates; (2) the Executive Board, the executive organ of the Health Assembly, con-

sisting of 18 persons designated by as many member states; and (3) a Secretariat, under the Director-General.

During the first few months of the existence of WHO, plans were prepared and operations were begun for launching offensives against disease. Expert committees, made up of international experts, advised the Director-General on the planning of immediate and long-term programs for improving world health.

Malaria, which still attacks, incapacitates, and kills millions of people in many parts of the world, but which lends itself to effective new measures of prevention and treatment, was one of the first diseases to which WHO gave special attention. The Interim Commission recognized that the problem of malaria was sufficiently urgent and important to warrant immediate action; an Expert Committee on Malaria was therefore established.

Committee Established

The Expert Committee on Malaria, at their second session in Washington, D. C., May 19-25, 1948, recommended that an Expert Committee on Insecticides be set up to specify international standards for insecticides and their formulations, to stimulate the development of standard spraying equipment on a regional basis, and to deal with all other questions relating to the proper use of insecticides. In response to these recommendations, an Expert Committee on Insecticides was established.

The original committee consisted of three members. In May 1950, however, the World Health Assembly authorized the appointment

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of an expert advisory panel, from which a small number of experts are drawn to attend each meeting, depending upon the subjects to be considered.

First Session

The Expert Committee on Insecticides held its first session in Cagliari, Sardinia, May 10-15, 1949 (1). This choice of location afforded members the opportunity of gaining first-hand knowledge of the work being carried out in Sardinia under the joint auspices of the Italian Government and the Rockefeller Foundation (Ente Regionale per la Lotta Anti Anofelica in Sardegna—ERLAAS) in freeing the island of malarial mosquitoes by means of insecticides.

In addition, the committee was able to study the measures developed for preventing the reinfestation of the island from sea or air. Therefore, this group was in a position to make suggestions to the Expert Committee on International Epidemiology and Quarantine for the drafting of WHO regulations on the disinsectization of ships and aircraft.

The terms of reference of the committee were the following:

1. To advise the Expert Committee on Malaria regarding specifications of international standards for insecticides and their formulations for use against vectors of the disease, and of standard spraying equipment for malaria control and its adaptability to regional conditions.

2. To draw up a standard method of disinsectization of ships and aircraft, to be submitted to the WHO Expert Committee on International Epidemiology and Quarantine for consideration in the drafting of WHO sanitary regulations.

3. To make recommendations concerning measures that might be given general application for the prevention of the introduction of anophelines into areas free or freed from them.

The work of the committee at this meeting included the drafting of specifications for DDT. Specifications used in the United States and the United Kingdom for commercial DDT were utilized as a basis for these specifications. In view of the number and diversity of insecticidal preparations and the paucity of

knowledge concerning many of the new ones, it was impossible to fix specifications for other insecticides at that time.

The committee restricted itself to laying down the general requirements which should be satisfied by the various types of both compression and hand sprayers, since it was considered that it would be impracticable to market a single model suitable for use in all regions of the world and complying with all requirements. The draft specifications referred to the materials utilized, capacity, and weight, as well as to certain points relating to the construction of the different component parts of the sprayer. Several technical improvements were recommended.

With reference to the disinsectization of ships, the committee adopted in principle the regulations, drawn up by ERLAAS, which were intended to prevent the reintroduction of anophelines into the island of Sardinia. These regulations provided essentially for antianopheline treatments of all ships arriving in Sardinia from specified areas. The committee also had the opportunity of attending disinsectization operations carried out aboard a cargo vessel and of judging the efficacy of the methods recommended. The disinsectization of a cargo vessel of 2,000 tons takes 1½ hours.

The committee was of the opinion that disinsectization of ships and aircraft when carried out efficiently constituted a safeguard against the introduction of anophelines. It was thought that the same methods should be considered for road traffic whenever necessary. However, the application of disinsectization measures, by quarantine services at ports and frontiers, can never insure complete protection; it is essential that systematic campaigns against anophelines be instituted in areas where malaria is endemic and that surveillance be continued in those areas which have been freed from the pests, so that immediate steps may be taken in the event of the accidental introduction or reintroduction of the insects. In regions which have been freed from anophelines, the use of residual insecticides for controlling domestic insects is an effective means of destroying introduced mosquitoes.

The committee also took the opportunity to contradict certain rumors which had been cir-

culated concerning the toxicity of DDT to man and mammals, and considered the exchange of literature and information and the free flow of insecticides among nations.

Second Session

At the second meeting of the Expert Committee on Insecticides, held in Geneva, October 4-11, 1950 (2), the primary topics of discussion were the disinsectization of aircraft and ships and specification for insecticides and equipment. Other problems considered included the prevention of the reimportation of anophelines into areas freed of this mosquito and the free international flow of insecticides. A joint session was held with the Expert Committee on International Epidemiology and Quarantine to agree on recommendations for disinsectization of ships and vessels in international services.

Recommendations for the disinsectization of aircraft were considerably changed from the ones made at the first session. It was felt that the actual disinsectization procedures then in force were not effective, and that treatment of passenger planes with insecticides was being done in a perfunctory manner. Passengers, in many instances, are not amiable to being exposed to an effective dosage of an insecticide, and for this reason many of the airlines are reluctant to employ adequate treatments. It was felt that disinsectization should be carried out before take-off, with all luggage and/or freight loaded, but without passengers. All ventilators and exterior apertures should be tightly closed during spraying and for at least 5 minutes afterwards. If for any reason, passengers and/or crew have to disembark and re-enter the plane after treatment, the spray operation may be repeated at the discretion of the health authority. If adequate disinsectization is not carried out before departure, it may be done with passengers and crew aboard before the plane is landed. However, the disinsectization of planes without passengers aboard is desirable since this permits the use of more effective insecticides and the application of heavier dosages. This procedure may be a step toward fulfilling the requirements of both agriculture and public health procedures.

In addition to disinsectization procedures, antimosquito measures around airports should be rigidly carried out and a system of inspection set up to assure that this is done. It is desired that WHO be kept up to date on information relative to sanitary conditions, including presence or absence of vectors of disease around airports which are open to international traffic.

With reference to disinsectization of ships, it was again considered that antimosquito sanitation of seaports was essential. The committee recommended that the routine treatment of ships arriving in ports in areas declared free of vectors should be abandoned and replaced by routine inspection. Of course, in very small craft, routine treatment is often more economical and less time consuming than inspection. The committee pointed out that since ordinarily treatment will be carried out only on infested vessels, space-spraying may be more appropriate than spraying for residual-deposit effect; however, for ships in regular and frequent services between infested and free ports, residual treatment would probably be the method of choice.

As a space spray for use in the disinsectization of ships, the committee recommended an aerosol of pyrethrins and DDT dispensed at the rate of 10 gm. per 1,000 cubic feet of inclosed space. For residual treatment, DDT sprayed at the rate of 200 mg. per square foot was advised.

The following specifications for insecticides were recommended:

1. Revision of specifications for technical DDT.
2. Specifications for DDT wettable powder concentrates of 50 percent or over.
3. Tentative specifications for DDT emulsion concentrate of 20 percent and above.
4. Specifications for technical benzene hexachloride (12-14 percent gamma-isomer BHC).
5. Specifications for gamma-isomer benzene hexachloride concentrates of 90 percent and above.
6. Specifications for technical benzene hexachloride wettable powder concentrates (50 percent technical BHC and over).

7. Tentative specifications for technical agricultural grade and clarified grade chlordan.

8. Guidance information for the purchase of methoxychlor.

In the matter of equipment, specifications were formulated for compression and hand sprayers as established at the first session of the committee. In addition, preliminary specifications for stirrup pumps, which are extensively used in some parts of the world in malaria control activities, were set forth.

The hope was expressed that WHO would meet with success in its endeavors to insure a free flow of insecticides and the waiving of customs duties.

The recommendations of the Expert Committee on Insecticides, when approved by the Executive Board, become official for use by all member nations of WHO. They do not in any way hamper improvements in techniques or equipment by member nations, but they do insure that nations with insufficient technical information are given proper guidance in conducting their vector-control programs.

There can be no doubt that the recommendations of the committee have advanced the effectiveness of malaria control in many countries, and future meetings will augment the information already available to backward areas. It is hoped that eventually recommendations of the expert committee will encompass all important vector-control problems throughout the world.

A necessary function in accomplishing this feat is a continuing and expanding program of research. The rapid increase in the use of insecticides has given rise to many problems not originally envisaged by either the health authorities or the insecticide manufacturers. Furthermore, practical application in the field of insecticides has gone far ahead of fundamental research. With these considerations in mind, the Expert Committee on Insecticides, at its second session, recommended "that WHO draw the attention of member governments to the fact that, for the practical continuation of disease-vector-control throughout the world, an increase in fundamental research work has become even more imperative than heretofore."

Third Session

The third session of the Expert Committee on Insecticides met at Savannah, Ga., July 30 to August 4, 1951 (3). The recommendations set forth at this meeting, however, have not been approved by the Executive Board of WHO and, therefore, cannot be reported in detail at this time.

In general, the committee established specifications for stirrup pump type sprayers, hand and rotary dusting apparatus, and certain types of spray hose. Specifications were also established for spray control valves and hose connections, and a specification chart for compression sprayers was approved. This chart will enable those selecting sprayers to determine the attributes of various commercial models with reference to their compliance with WHO specifications.

One of the most valuable pieces of work accomplished by the committee was the establishment of standard nomenclature for types and parts of spraying equipment. The international adoption of these recommendations will alleviate much confusion relative to the purchase and use of spraying equipment. It is sincerely hoped that all governments and manufacturers will adopt these recommendations after their approval by the Executive Board of WHO, and that future meetings of the Expert Committee will augment the present list of definitions to keep pace with the development of spraying equipment.

"The attainment by all peoples of the highest possible level of health" has become the watchword and the goal of WHO, and the Expert Committee on Insecticides is a potent factor toward accomplishing this end.

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- (3) Expert Committee on Insecticides: Report on the third session. To be published in the World Health Organization Technical Report Series.

Insecticides

and

Rodenticides

1952 Recommendations for use

Laboratory and field investigations to determine the effectiveness and toxic hazards of various economic poisons which offer promise for use in communicable disease control have been conducted for several years by the technical development branch of the Communicable Disease Center. The results of these investigations and a review of work done by other research agencies have been used as a basis for recommendations on materials, dosages, and application techniques for use in field operations.

The rapidly changing status of resistance to insecticides exhibited by some insect species makes it difficult, if not impossible, to make general recommendations for their use in all areas. Consequently, it will be necessary for operators in any given area to adapt these recommendations to the situation at hand.

Mosquito Control

During the past year, there have been indications from several scattered areas in the world that some species of *Anopheles* are developing resistance to DDT. Some evidence has been developed by workers of the Tennessee Valley Authority that *Anopheles quadrimaculatus* may be developing resistance to DDT in some localities in which DDT has been used continuously for more than 5 years. However, in general this species does not appear to have de-

veloped resistance to DDT to a degree which would significantly affect control operations. The continuation of previously adopted procedures for the control of *A. quadrimaculatus* is recommended for 1952, namely, the use of 5-percent DDT emulsion residual sprays in homes to control the adult mosquitoes and the use of 0.05 pound of DDT in 1 gallon of fuel oil per acre to control the larvae; DDT at the rate of 0.05 to 0.10 pound per acre, applied as a 20-percent solution in methylated naphthalenes, such as Velsicol NR70 or Sovacide 544B, is recommended for airplane treatment; and a 5-percent DDT emulsion or a 5-percent DDT oil solution for outdoor space spraying to control adult mosquitoes.

The only known mosquito vector of disease which appears definitely to have developed a high degree of resistance to insecticides in the United States is *Culex tarsalis* in California. Observations by the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture indicate that in some localities this species has developed varying degrees of resistance to a number of chlorinated hydrocarbons, including DDT, toxaphene, lindane, aldrin, and heptachlor applied as space sprays. Although no specific recommendations can be made for control of the resistant strains of this species, DDT-DMC combinations, and perhaps other DDT-synergist combinations as they become available, may be used on a field trial basis. Combinations of DDT with DMC (*p*-dichlorodiphenyl methyl carbinol) at ratios from 5:1 to 20:1 have been effective as space sprays against field strains of DDT-resistant houseflies.

DDT Substitutes

Salt-marsh mosquitoes in several areas are unquestionably resistant to DDT and other insecticides. As an initial substitute against DDT-resistant strains, the Bureau of Entomology and Plant Quarantine found lindane at 0.1 pound per acre or technical BHC (benzene hexachloride) at 0.4 pound per acre, both applied as fuel oil solutions from airplanes, to be an effective larvicide. During 1951 poor results were obtained with BHC in some localities. Field trials of DDT-DMC or other DDT-synergist combinations are recommended when salt-marsh or other pest mosquitoes have become resistant to the chlorinated hydrocarbons. Where resistance is not a factor, DDT remains the insecticide of choice.

Against some species of pest mosquitoes which have not developed resistance to DDT, barrier-strip residual spraying with DDT around the outside of individual premises has given effective control. In the Savannah, Ga., area, preliminary tests using 1-percent DDT emulsions applied to the outside of houses, and to shrubbery, grass, and other vegetation for a distance of approximately 100 feet around the houses, gave satisfactory reductions against the common species of salt-marsh mosquitoes for about 3 weeks. It is recommended that similar procedures be used experimentally in situations where other control measures are not more feasible, as for example to protect individual premises or groups of premises in irrigated agricultural areas.

Residual larviciding with technical BHC (12-percent gamma iso-

This paper was prepared by the technical development branch of the Communicable Disease Center, Public Health Service, Savannah, Ga.

mer) emulsions at the rate of 1 pound per acre (in gallons of finished spray per acre applied in the same manner as oil solutions) has given satisfactory mosquito control in small, land-locked, fresh-water ponds against a variety of anopheline and culicine species for periods ranging from 5 to 8 weeks. No damage to fish was observed during 3 consecutive years of treatments with BHC, during which five treatments were made each year spaced at approximately 5-week intervals between April and October for a total of 15 1-pound-per-acre applications during the 3-year period. There was some indication of off-taste in fish from one of the treated ponds in which unusually low water levels had prevailed at the end of the third year of treatment. It appears that technical BHC (12 percent gamma isomer) can be applied safely as emulsions at the rate of 1 pound per acre at approximately 5-week intervals without damage to fish for 3 consecutive years. This procedure is recommended for residual larviciding where fish are present.

When fish are not present, effective control for periods ranging from 3 to 6 months has been accomplished near Savannah by residual larviciding with DDT emulsion at the rate of 3 pounds per acre (in 2 gallons of finished spray), using the method usually employed in applying oil-mist sprays as mosquito larvicides. *This treatment is totally destructive to fish present in the ponds at the time of treatment, and should not be used where fish are present.*

Dieldrin applied as an emulsion concentrate or a wettable powder suspension at the rate of 1 pound per acre will also prevent mosquito breeding for more than 1 year. *However, it is completely destructive to certain other aquatic life, and should not be used except in emergency or in other unusual circumstances.*

Fly Control

Residual Sprays

In most areas of extensive use of residual sprays, houseflies have be-

come highly resistant to DDT and in some instances to several other chlorinated hydrocarbons. Unfortunately, the work of the past year with residual insecticides has produced very few promising leads for the solution of this problem.

DDT is still the insecticide of choice in areas where houseflies remain susceptible to it, except in dairy barns and other places where it may contaminate milk. A 5-percent emulsion or suspension applied at the rate of 4 ml. of spray per square foot of treated surface area is recommended for general use. Where outdoor treatments are required, the addition of pine gum rosin to give 2 percent rosin in the finished spray increases the residual effectiveness of the DDT.

Dieldrin applied as a 0.625-percent emulsion is recommended as an outdoor residual spray for use by trained personnel in organized fly control programs in areas where DDT-resistant flies may still be susceptible to this compound. However, fly populations may develop resistance to dieldrin in less than one season and in some areas it has already become ineffective through the development of such resistance. The precautions which have been recommended in the "Operational Memorandum for Dieldrin," issued by the technical development branch of the Communicable Disease Center, should continue to be observed in dieldrin spraying operations.

Chlordan is recommended for selective spot treatment inside dwellings and on porches, insides of out-buildings, and other locations relatively protected from the weather, in areas where flies have not yet become resistant to this insecticide. A 5-percent emulsion is recommended for this general use, except that formulations used within dwellings should not contain more than 2.5 percent chlordan.

Lindane applied at the rate of 25 mg. per square foot, or methoxy-chlor at 200 mg. per square foot, is recommended for use in dairy barns, feed barns, and other places where the use of other chlorinated hydrocarbons might contaminate milk. However, neither of these may be expected to give the degree of control

originally achieved with DDT residuals, particularly where flies are already highly resistant to DDT.

Dilan is suggested as a residual spray for experimental testing on operational fly control programs. Current information indicates that 2.5- to 5-percent suspensions of water-wettable dilan are effective as a residual spray against DDT-resistant flies. However, there is already evidence from laboratory studies that flies may develop resistance to dilan within a relatively short time.

Larvicides

The use of larvicides may be desirable for fly control in certain situations, as in the treatment of dirty garbage cans and privies or of concentrated fly breeding areas such as at stockyards or chicken farms. Several of the chlorinated hydrocarbons are effective fly larvicides, but their use may result in the development of the same resistance encountered when they are used as adulticides. Among the more promising larvicides for general use are chlordan, lindane, and BHC. Dieldrin and aldrin are also effective fly larvicides. These materials should be applied at the same dosages per square foot as recommended for residual sprays. In general, it appears desirable to dilute the residual spray emulsions or solutions to three to five times their original volume in order to provide better penetration of the larvae breeding medium. The same precautions in applying dieldrin or aldrin as larvicides should be observed as when dieldrin is used as a residual spray.

In small-scale field tests, applications of paradichlorobenzene crystals (PDB) at the rate of 2 oz. per garbage can has controlled fly breeding for 1 to 2 weeks. This procedure is suggested for trial in areas where flies are resistant to other types of larvicides.

Space Sprays

When flies have become resistant to the aforementioned materials applied as residual sprays or larvicides, space sprays are the only alternative for chemical control. Selective treatment of night-time resting places with space sprays appears to be a

promising approach because of the concentration of flies in limited areas at night. In urban areas, houseflies and the more common blowflies generally rest at night in the lower branches of trees and in bushes, grasses, and weeds. During cool weather, houseflies tend to seek the protection of outbuildings. Species of *Drosophila* appear to rest predominantly in privy pits or buildings. In rural areas, the inside of unscreened dwellings is a favorite resting place. On premises with screened dwellings, the flies rest on porches and in animal shelters during cool weather, and on the lower branches of trees and on shrubs in warm weather (minimum daily temperature 70° F. or above). Since temperatures and local environmental conditions affect the flies' choice of nocturnal resting place, limited local surveys should be conducted as a guide to night-time space spraying operations.

Combinations of DDT with DMC at ratios ranging up to 20:1 have given effective kills when applied as space sprays against field strains of DDT-resistant flies. Emulsions or fuel oil solutions of this combination, using 5 percent DDT, may be used as space sprays for fly control. Other DDT-synergist combinations are under investigation.

In small-scale field tests 2.5-percent emulsions of dilan applied as outdoor space sprays at dosages of 0.05 pound per acre were highly effective against DDT-resistant flies. The emulsions were prepared with technical dilan in the same manner as with DDT. It is recommended that technical dilan be utilized at 2.5-percent concentrations in operational programs where flies are resistant to other insecticides.

Among the most reliable and least toxic to humans of the space sprays are pyrethrum formulations, which are usually used in indoor space sprays and are the insecticide of choice for this purpose. Pyrethrum formulations are used in combination with synergists such as piperonyl butoxide, in emulsions or oil solutions containing from 0.05 to 0.1 percent pyrethrins and 0.5 to 1.0 percent of the synergist. However, they are currently in short supply

and are too expensive for general large-scale use in fly control.

Where flies are still susceptible to BHC, a 5-percent technical BHC (12 percent gamma isomer) or a 2-percent lindane emulsion is recommended as an outdoor space spray for use against flies resistant to DDT and chlordan. Where odor is not a factor, the technical BHC is favored because it is cheaper. The development of fly resistance to these compounds may be expected if they are used regularly.

A 2.5-percent emulsion of chlordan may be used as an outdoor space spray against DDT-resistant flies. Houseflies in some areas have developed resistance to space sprays of this material. Housefly resistance to it may be expected to appear if it is used continuously for fly control.

Sanitation

The development of housefly resistance to many different types of insecticides has refocused attention upon the importance of sanitation as a fly control measure. There is universal agreement that sanitation should be exploited to the fullest degree possible in conjunction with the use of chemicals for fly control. Insecticides are more than ever a supplement to sanitation rather than a substitute for it. The value of screening as a fly control measure is also worthy of re-emphasis.

Flea Control

In field tests conducted over a period of 3 months, a 5-percent DDT dust has been found to be as effective as a 10-percent dust when applied to rat runs and harborage areas for the control of the oriental rat flea. The 5-percent dust has been used on some operational programs. However, most operators have preferred to use the 10-percent formulation, particularly where it was desirable to control other ectoparasites more resistant to DDT, for example, the cat flea.

A 10-percent chlordan dust is recommended for use in controlling soil infestations of cat and dog fleas. A single application of this material has given effective control of infestations, whereas repeated applica-

tions of DDT would have been required.

Roach Control

A 2- to 2.5-percent emulsion or oil solution of chlordan is recommended for spot spraying for roach control in homes. Such treatment should be confined to limited harborage areas, such as space behind baseboards, in cracks and crevices, and around openings through which roaches may gain entrance from the outdoors. Over-all applications of chlordan should not be made in homes.

Rodenticides

The possibilities of rodent control appear to be more encouraging than ever before, for, unlike insects, rats do not seem to have developed resistance to poisons.

Warfarin

The most recent addition to the rodenticides, warfarin, maintains its early promise. It is the first effective slow-acting rodenticide, and its characteristics—(a) failure to induce bait shyness, (b) necessity for repeated ingestion if control is to be achieved, and (c) relatively small hazard to man and useful animals compared to the hazard offered by most other effective rodenticides—make it the first effective residual rodenticide ever developed. According to results of tests completed during the past year, the warfarin susceptibility of the different species of commensal rodents differs. This has been confirmed by laboratory field studies. Therefore, in the interest of economy and safety, it appears only reasonable to use the lowest bait concentration consistent with the most effective control.

Dependable control of the roof rat, *Rattus rattus*, requires the use of a concentration of 0.250 mg. of warfarin per gram of bait (0.025 percent). However, field tests have shown that a concentration of 0.050 mg. per gram (0.005 percent) is effective for control of the Norway rat (*Rattus norvegicus*). Mice react in the same general way as Norway rats although they show more individual variation. There is

evidence that under certain conditions Norway rats may be controlled a little more rapidly, though no more surely, by use of bait containing 0.100 mg. of warfarin per gram of bait instead of a concentration of 0.050 mg. per gram. There is a real opportunity for those associated with city and county programs to determine by careful operational observations which of these two concentrations is more desirable for use in organized control campaigns carried out by personnel who have received some training in rodent control but who make no claim to be experts in the field. However, if the species of rat concerned is not definitely known, the 0.025 mg. per gram concentration should be used.

Warfarin may be used for initial rodent control under essentially all conditions, using a minimum baiting period of 2 weeks. In addition, consideration should be given to establishing bait stations for permanent control of rats in places which are subject to reinfestation. Two years of experience has shown that Norway rats can be controlled in non-ratproof buildings so long as poisoned bait is available. No difference in this residual effectiveness of the 0.100 and the 0.050 mg. per gram bait concentrations was observed. The bait stations were inspected approximately every 6 weeks and fresh poisoned bait was supplied.

ANTU

ANTU still holds a definite place as a quick-acting poison for the Norway rat. Its use to reduce large populations rapidly may be followed by the use of warfarin to achieve complete and lasting control. ANTU should not be used against the same population more often than about once a year. It induces a very persistent bait shyness in rats and this property makes it ineffective for repeated use against the same population. It is not effective for the control of roof rats or mice. Its safety record is good so that it may be used in residences and food-handling establishments.

Sodium Monofluoroacetate (1080)

Sodium monofluoroacetate (1080) is still the most effective, fast-acting rodenticide, but its extreme toxicity to man and animals requires that it be used only on certain types of premises and only by carefully trained crews. The precautions necessary for the safe use of 1080 are numerous and involved. They are described in "Operational Memoranda on 1080," issued by the technical development branch of the Communicable Disease Center.

Baiting Problems

In tests in Savannah, corn meal has proved to be the most readily

accepted cheap bait. In general, any available cereal bait is recommended for use. It is worth emphasizing again that under certain conditions it is very difficult to get rodents to take bait; for example, where food is available in great variety and abundance, as in some warehouses. Such conditions constitute baiting problems, a term which implies that the origin of the problem is not in the particular poison used but in the ecology of the animals themselves. Obviously, in testing any given rodenticide formulation, it is necessary to make sure that apparent failure of the formulation is not caused by baiting problems. These problems can be solved efficiently only through extensive knowledge of the habits of the rodents. They do not occur more frequently when simple cereal baits such as corn meal are used than when complex bait mixtures are used.

Sanitation

The importance of sanitation, including proper garbage disposal, food storage, harborage elimination, and ratproofing must be emphasized. Sanitation is essential to the permanent control of commensal rats and mice and the use of rodenticides should be regarded as supplementary to sanitation.

Conference on Aging

"Housing the Aging" will be the topic for a conference to be held in Ann Arbor, Mich., July 24-26, 1952, under the co-sponsorship of the University of Michigan, the Michigan State Medical Society, the Committee on Aging and Geriatrics of the Federal Security Agency, and the Housing and Home Finance Agency.

The 3-day conference will consider the housing needs of healthy, chronically ill, and disabled older people. Types of housing and living arrangements, architectural designs and costs, hygiene and safety standards, social and economic aspects of housing, and auxiliary services will be discussed.

Registration information may be obtained by writing to Dr. Wilma Donahue, Institute for Human Adjustment, Room 1510, Rackham Building, Ann Arbor, Mich.

Mosquito Control in Water Resource Projects

These remarks by Dr. Saxvik, and those of Dr. Rowe which follow, are part of a discussion before the 52d meeting of the Missouri Basin Inter-Agency Committee held at Bismarck, N. Dak., October 24, 1951. The committee, created in April 1945, provides a means through which field representatives of Federal agencies exchange information and coordinate activities—among themselves and with the Missouri Basin States—in the preparation of reports and in the planning and execution of works for the control and use of the waters of the basin and for the development of the basin's resources.

I. Prevention vs. Abatement

By R. O. SAXVIK, M.D., M.P.H.

Today, we in this country have fashioned for ourselves the highest standard of living yet known to man. We are no longer content to exist in the midst of an unsanitary, dangerous environment. The fight for new remedies and treatments for control of disease is constantly going on. Advances in sanitation which have contributed to the convenience and comfort of the individual have been promptly adopted. Sanitary measures must interpose a barrier in some channel of infection to block the path between the carrier on the one hand and susceptible persons on the other.

Public thinking is on the threshold of a new concept of environmental health. Mosquitoes have been proved to be vectors of disease, but the constant annoyance caused by these insects can seriously impair physical and mental well-being. We have the know-how for controlling mosquitoes, and even for preventing their prop-

agation. We are not going to sit idly by while subjected to the annoying and sometimes dangerous attacks of hordes of mosquitoes.

The Deputy Surgeon General of the Public Health Service, Dr. W. Palmer Dearing, stated on October 12, 1950 that "There are, however, other public health concerns which justify State stipulation as to mosquito control in water impoundment and irrigation projects. The viral encephalitides (forms of 'sleeping sickness') of which there are three major types, endemic and occasionally epidemic in the United States, are transmitted to man by mosquitoes of various species. Human encephalitis is a dangerous disease attacking man in a manner similar to poliomyelitis."

Dr. Dearing, in the same statement, said, "It is our conviction that pest mosquitoes should receive more attention from health authorities than they have in the past. Public health has become more than the absence of disease. Physical efficiency and comfort, on which mental equanimity depend to a substantial degree, may be seriously disturbed by the continued annoyance of pestiferous mosquitoes which may or may not have disease-transmit-

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ting potentialities. This principle has already been recognized by the Departments of the Army and of the Air Force in the development of pest mosquito control methods to be used for the protection of troops in the Arctic."

Mosquito Control

Mosquito control undertaken because of public demand usually becomes the responsibility of the local health department. After the problem has been allowed to develop, control by modern methods is both difficult and expensive. More public dollars are required and a greater potential hazard exists. In California, the annual expense for mosquito abatement alone is now nearly 2 million dollars. Where irrigation is extensive, typical costs per year, by counties, are: Alameda, \$108,000; Fresno, \$94,976; and Merced, \$166,668. These figures do not reflect the cost of a complete program of correction. It is estimated that effective control of the overall problem would cost approximately 10 million dollars per year. Much prevention could have been effected at a nominal portion of this cost. In the Milk River Area of Montana, Malta and Glasgow, towns of 2,500 and 4,000 population, respectively, have found it necessary to begin mosquito control, and have annual budgets of \$3,000 and \$2,000 for this work. They are too late to prevent mosquitoes so they are beginning the costly cure. The same situation exists in several States where irrigation is practiced. Experience has demonstrated that through active and cooperative efforts of all the various agencies and groups engaged in water development work, a great many problems will be avoided and others will be minimized if careful planning for mosquito control precedes construction work.

Encephalitides Vector

Mosquitoes have been shown to transmit at least five strains of encephalitides—western and eastern equine, St. Louis, California, and Japanese B. The Missouri River Basin has representatives of the species of mosquitoes that carry these five strains. Also, several unidentified viruses associated with mosquitoes in nature have been found through recent research.

Pathogenicity of these viruses to human beings remains to be determined.

In North Dakota, during the past 5 years, there have been 285 cases and 29 deaths due to encephalitis. During 1936–40 there were 160 cases with 60 deaths, while in the period 1941–45 there were 1,215 cases, with 187 deaths. This last period includes the epidemic of 1941 when in 1 year, there were 1,101 cases resulting in 134 deaths. During this epidemic, the case incidence was 171 per 100,000 population with a mortality rate of 20.8 per 100,000 population, indicating that encephalitis is a real problem in North Dakota.

Serologic Examinations

The Rocky Mountain Laboratory of the Public Health Service, at Hamilton, Mont., has been examining a series of routine blood samples submitted to the North Dakota State health department laboratories for examination of antibodies of western equine encephalomyelitis in human beings. A total of 2,194 serums was examined; 356 showed a positive result. Samples from all 53 counties in the State were included. On a percentage basis, this was a 16.2 percent positive sample, or one out of six serums examined. We fully realize the seriousness of this disease when we consider that one out of six residents of North Dakota has had encephalitis in varying degrees of severity at one time or another, if the results of the tests of blood samples are representative of the extent of infection in residents of the State.

As yet, there is no known specific therapeutic treatment for virus encephalitis. The importance of prevention is immediately obvious: prevention is possible only through the control of the mosquito vectors. There is presumptive epidemiological evidence that poliomyelitis may possibly be transmitted by biting insects, perhaps mosquitoes, and if by mosquitoes, then by species widely prevalent in this area.

A study of the outbreak of encephalitis in Barnes County in 1949 lends support to this evidence. During a brief period, three distinct types of central nervous system illness occurred. Two of these were caused by known diseases—poliomyelitis and western equine en-

cephalomyelitis—but antibodies for the recognized neurotropic viruses present in this area were not found among the greater number of ill persons, indicating the existence of a third undetected and unidentified virus whose mode of transmission is unknown.

Equine Encephalitis

While encephalitis in equines is not considered a public health problem, the disease has economic importance and is of considerable concern to agricultural interests. The number of cases in horses is steadily dropping, which can be accounted for by the 300-percent reduction of the horse population during the last 15 years. Pest mosquitoes are of economic importance to the dairy and stock farmer. It has been proved that milk losses are considerable on dairy farms during the mosquito and fly season. Beef cattle, if bothered by pest mosquitoes, fail to gain weight or to develop properly. In considering the over-all benefits of mosquito abatement, these agricultural benefits must be taken into account.

Control Program

The North Dakota State Department of Health has initiated a mosquito survey and control program. Through the cooperation and financial aid of the Public Health Service an entomologist has been obtained to work with Federal, State, and local agencies toward carrying out mosquito-prevention measures during the planning, construction, and operation of water resources projects. The entomologist will evaluate present habitat and species found in the State, and will seek to determine what disease-carrying species are present. The changing ecologic conditions will also be studied to evaluate the future mosquito problem.

It is the sincere hope of all health officials that future water resources development projects include antimosquito precautions and practices. Efforts aimed at the elimination or minimization of health hazards due to mosquito vectors would do much to control disease trans-

mission, and at the same time would tend to reduce the density of pest mosquitoes. If this is done, another step forward in the improvement of our environment will have been made.

Control and Poliomyelitis

It has been observed that in the past few years a high percentage of cases of poliomyelitis have come from rural areas where DDT and other insecticides are not widely used for control of mosquitoes. Although there is no positive data available, workers in the field have observed a lowering of the incidence of virus diseases in urban areas where DDT is used to control mosquitoes. This has been true in North Dakota, where a majority of cases of poliomyelitis and encephalitis have occurred among rural residents, rather than in the larger communities where mosquito control has been practiced.

Data show that many species of animals serve as hosts to the viruses, with a widespread and complicated infection chain in nature which involves arthropods, birds, and small mammals. Data bearing upon mosquito transmission of the virus are sufficient to propose that antimosquito measures are the best method of control at present. A barrier between the carrier and susceptible persons must be established by adequate mosquito control. It is the only known method for controlling encephalitis and perhaps other virus diseases. North Dakota now has a considerable mosquito problem due to large areas of stagnant water in potholes and low-flow streams during the warm summer months. The development of irrigation, if not properly constructed, will increase this problem. Water is a factor common to all outbreaks of encephalitis. Water determines where maximum populations of people will be found and where mosquito densities will be greatest. The encephalitis rate is now excessively high in North Dakota, and if we allow an increase in mosquito density, we will have a problem of increased magnitude. It is essential that present mosquito problems not be aggravated and that new ones not be created.

II. Insect Problems and Irrigation

By JOHN A. ROWE, Ph.D.

Water development in this country has produced a host of mosquito problems stemming from various types of projects. Some of these problems have come about through faulty construction while others are due to bad practices in the use or operation of projects. Mosquito problems associated with water development programs result from water standing too long on the surface of the ground, thus creating breeding places for mosquitoes. Until recently, neither the builders nor the operators of projects were fully aware of the nature and size of these mosquito problems and, hence, could not be expected to initiate measures to prevent them. Local, State, and Federal health agencies for several years have studied these problems in an effort to find practical methods for preventing and controlling mosquitoes.

Mosquito problems associated with storage reservoirs or other impoundments have been fairly well delineated through field studies. The results of these studies have been published in numerous technical papers. They are summarized in "Malaria Control on Impounded Water" (U. S. Government Printing Office, 1947). It is not desirable at this time to review water impoundment problems and the control measures which are thoroughly covered in this summary, but rather to describe briefly and discuss examples of major mosquito problems associated with irrigation.

Dr. Rowe, senior scientist with the Public Health Service, is assistant chief of the water resources section of the vector control and investigations branch, Communicable Disease Center, at Salt Lake City, Utah.

Irrigation of Pastures

In the Western States, probably the most serious mosquito problems result from the irrigation of native grass pastures and "wild" hay lands. The severity of these problems is well known to the inhabitants of the valleys of California and Utah, and to those of the valleys of the Milk River in Montana, the Platte River in Nebraska and Colorado, and elsewhere. The numbers of mosquitoes produced on these irrigated pastures reach astronomical proportions. In California, for example, one mosquito trap operated near an irrigated pasture for three nights collected nearly a gallon of mosquitoes. Mosquito-egg counts from pasture sod samples have shown that as many as 20,000,000 eggs of *Aedes nigromaculis*, a western pasture mosquito, may be present on an acre of irrigated pasture. These tremendous numbers of mosquitoes do not occur in only one or two broods each year, as may be the case in "dry land" areas, but a new brood is produced following each successive flooding of the pastures throughout the irrigation season.

Studies in the North Platte Valley and elsewhere show that a combination of factors produce the severe mosquito problem on these pastures and hay lands. In many instances the fields were not prepared to receive irrigation water, and consequently their surfaces are irregular and unlevel. Because of this, the irrigators must force tremendous amounts of water over the land in order to cover the high spots. Extensive areas covered to a depth of 18 inches may be observed regularly. In many instances, even where land is fairly level, huge amounts of water are literally poured onto the pastures. As a result of these practices, high-

way and railroad rights-of-way and large tracts of unused land are inundated during each irrigation turn. Over extensive areas of bottom pasture land the major drainage structures have deteriorated and become ineffective, and in most areas no drainage structures are evident for the removal of water from roadways or unused land, or for draining off excessive amounts of water from pastures.

These conditions over literally thousands of acres of native grass pasture have created choice ecologic habitats for several of the most predacious mosquito species in our western fauna. To the layman it appears also that the quality and productiveness of the land have been adversely affected.

The control of mosquito problems on irrigated native grass pastures cannot be accomplished unless the principles of "conservation-irrigation" are effectively applied. Because of established customs and habits, and because of the apparently abundant supply of irrigation water, in certain areas, the successful application of these principles to existing irrigated pastures will be difficult and will require the active cooperation of all agencies, groups, organizations, and farmers involved. The prevention of such problems on future irrigation developments, however, should be an easier task and one which, when successfully accomplished, should result in great public benefits. Unless the water development agencies and others concerned willingly attack this problem on existing and future irrigation projects, the States whose people utilize the projects ultimately will be forced to spend large amounts of public funds on an annually recurrent basis for artificial and difficult mosquito control measures as in California, Utah, and elsewhere. Otherwise the fullest potential productiveness of the projects will be retarded.

Seepage Areas

From the very beginning of irrigation in this country, seepage areas have been a major problem confronting the farmers, the irrigation companies, and the water- and soil-development agencies. To these groups "seep areas" mean reduced production, inefficient water distribution, water loss, and the depletion of desirable

qualities of the soil. Some regions report as much as 50 percent of the water diverted from streams or from storage reservoirs is "lost" to seepage, and in certain irrigation districts thousands of acres of seep land exist. Health agencies are concerned with seepage areas because of the mosquito problems involved. Available data indicate that many types of seeps, where the water actually reaches or covers the surface of the soil, produce extremely large numbers of *Aedes*, *Culex*, and *Anopheles* mosquitoes.

The control or prevention of seepage areas is a difficult and expensive task. In many instances it involves the treatment of canals and laterals to prevent water loss. In other instances, it requires closer attention to the water requirements of specific crops in order that seepage resulting from deep water percolation may be reduced. Statements have been made to the effect that because of downstream recoveries, water arising from "flowing seeps" is not entirely wasted. This may be true; nevertheless, these seepage areas represent acute mosquito problems which appear to be increasing in magnitude.

In present and future irrigation developments the anticipation of seepage problems is a major concern of the responsible water development groups. Structures to prevent seepage from canals and laterals should be installed where needed and surface water arising from deep percolation should be channeled and concentrated to the greatest possible extent.

Drainage

Major mosquito problems on irrigation projects often result from inadequate provisions for drainage. Field studies show that this is especially true on the older irrigation developments. When old irrigation developments are compared with new ones, progress in the drainage features of the project are readily recognized. The water development agencies responsible for this progress are to be complimented. For the most effective mosquito prevention, however, further progressive drainage actions are needed. On most projects, the extension of drainage provisions would go a long way toward eliminating mosquito problems cre-

ated by the wastage of water into highway and railroad rights-of-way and other waste areas. For instance, field data from studies of recently completed projects on certain grade A lands show that the only mosquito problems in these areas were those created by the wastage of water from cultivated fields. There is no doubt that if, during the construction phases of these projects, the basic drainage plan had been extended to include drainage of roadways and other waste areas, virtually mosquito-free projects would have resulted.

In overcoming this problem it is realized that the jurisdictions of groups other than the primary construction agencies are involved. These include units of State and local governments, private companies, and individuals. Nevertheless, it would seem that opportunities are presented during the planning and developmental phases of the projects for the discussion of these problems and for making basic provisions for such drainage extensions.

The conditions which have been described are examples of only a few major mosquito problems associated with the development and operation of irrigation projects. Many other situations are known which constitute significant problems in certain areas, such as (a) surface water due to overflow or leakage from poorly maintained irrigation distribution systems; (b) impoundment of water in natural drainage ways due to the faulty emplacement of drainage and other structures; and (c) residual water in irrigation structures such as siphons, turn-outs, and drops, and in secondary canals and ditches. Individually, these and other conditions may not seem to be very significant, but when they occur repeatedly throughout a project they collectively become problems of considerable magnitude. Because the water involved serves no useful purpose, it is considered wasted.

Preventive Program

In cooperation with State health departments, the Public Health Service, through its Communicable Disease Center, is developing a program to aid the various water development agencies and groups in preventing mosquito problems on future water development projects, and to reduce the severity of existing prob-

lems on completed projects. The effectiveness and success of this program depend to a large extent on the support and cooperation received from other groups or agencies. These include not only the Federal planning and construction agencies, but also units of State, county, and city governments; farm organizations; irrigation companies; and other water development groups.

The program is threefold: field investigations and research, cooperative basin-wide activities, and development of State programs.

Field investigations have been established in representative areas to determine, evaluate, and grade the factors which produce mosquito problems associated with water development programs and to develop and test field techniques and methods for overcoming these problems. It is hoped that certain additional field research studies can be initiated in cooperation with the research groups of other agencies. Investigations will involve both biological and engineering features.

The Public Health Service will carry out its responsibilities relating to mosquito problems in connection with basin-wide investigations and reports. The Public Health Service Drainage Basin Offices have initiated activities whereby the planning and construction agencies will be kept fully informed relative to major mosquito problems involved in water development programs. Reports of various agencies will be reviewed and the vector aspects will be called to the attention of the agencies concerned. Field surveys will be made of major representative units or projects, which are in the investigational stage of development, for the purpose of obtaining basic data which will permit the anticipation of vector problems. These surveys will be conducted in accordance with established Public Health Service policies.

Development and direction of activities relating to its own projects are, of course, the primary responsibility of the State. Where the development programs are more extensive and complicated, assistance may be possible through the loan of technical personnel to the State health departments. These men will be available to work on existing problems and will assist water development agencies working in

the State to prevent mosquito problems on future projects. The long-range goal is to assist in the establishment of sound, adequate programs in those States which have mosquito problems.

The program, in all its ramifications, is a positive one, to aid and assist in the fullest and

most beneficial development of our water resources. We hope that, through this program and with the cooperation of all interested persons and groups, the factors which have produced serious mosquito problems on water development projects in the past will be eliminated from the projects of the future.

Community Volunteers and Mosquito Control

By R. E. DORER

Volunteer mosquito control work by the residents of Stony Creek, Va., brought the town relief from the usual mosquito annoyance during the past summer.

The Stony Creek Woman's Club initiated and supervised the project, the school children did the inspection work, and the townspeople cooperated by eliminating mosquito breeding places on their premises.

The woman's club, seeking a youth activity it could sponsor in the community as part of a national club program, turned to the Virginia State Department of Health for advice on the feasibility of a mosquito control project.

In June 1951, the bureau of insect and rodent control in the department inspected and analyzed the conditions in the Stony Creek area, an agricultural community of approximately 400 people in the southern part of Virginia, 75 miles inland.

About a mile from town, there is a fresh-water marsh area of several acres. After checking on the mosquito species in the marsh, the surveyors decided the marsh could be disregarded as a primary mosquito source. Few mosquitoes of these species would find their way into town. Subsequent light-trap catches confirmed the practicability of this decision.

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The drainage ditch running through part of the town was marked for treatment with oil insecticides by the town sergeant and was thus disposed of as an inspection problem.

The major part of eliminating the fairly heavy production of domestic mosquitoes would depend upon alert and systematic house-to-house inspections and cooperation of the townspeople, the surveyors decided. They concluded that a voluntary program using the older school children during their vacation period was feasible and promising.

A detailed plan of procedure, which placed all the responsibility for its execution on the citizens of Stony Creek, was accepted and put into operation July 1, following a brief training course in the field for both youngsters and grown-ups.

Approximately 20 school children participated in the work until September 30. The town was divided into numbered districts, and



A typical mosquito source found in Stony Creek and removed by the young inspectors in the mosquito control project.

two young inspectors were assigned to each district. Each week they were given a different district. The inspectors always requested permission from the occupant before they investigated a premise—and met with wholehearted cooperation.

The inspectors recorded on a report form the premises inspected, the number of temporary and permanent breeding places found, and the action taken or recommended. They submitted the reports to the committee in charge at the end of each week.

When mosquito larvae were found in temporary containers, such as cans, bottles, buckets, or pans, the inspectors took a sample to show to the tenant and got permission to empty the containers.

The permanent breeding places, such as rain barrels and pools, basements, and cisterns, which the inspectors could not remove themselves, were reported to the club supervisor of the program. These places, with the consent of the tenant, were sprayed when possible by the town sergeant with larvicide purchased with funds appropriated by the town council.

In a town without a municipal water supply, the rain barrels presented a control problem. Through elimination, screening, or treatment of the barrels, much improvement was shown during the summer.

Field records indicate that 1,057 temporary mosquito breeding places were found by the inspectors and were eliminated during the 3 months the plan was in operation. A light trap was set up and serviced by a different pair of inspectors each week. Nightly catches were forwarded weekly to the Norfolk office of the bureau of insect and rodent control for identification and listing. Analysis of these trap records indicates that on no night during the period the program was in operation were there sufficient mosquitoes to cause annoyance.

As may happen in such a volunteer program, responsibility for achievement fell upon a few. Fortunately, enthusiastic leadership carried the program through its trial period. It received a fair test, and its success was indicated by the generally favorable reaction of the public. Various persons expressed approval, but the almost universal cooperation of the townspeople was, perhaps, the best evidence that the commu-

nity regarded the project favorably. Mayor Philip Freeman wrote on October 17: "I personally feel that it was very successful . . . for the first time in several years, it was possible to play croquet in my yard during the evening without being eaten alive by mosquitoes."

Probably, the program will not be continued in its original volunteer form; but it seems to have served more than one definite purpose. The people of Stony Creek have been made "mosquito conscious." They will no longer take these insects for granted under the mistaken impression that nothing can be done about them. Any improvement in living conditions is welcomed by the people affected, and they are usually willing to make a reasonable contribution of money or effort to insure continuance. Firsthand familiarity with the mosquito and its habits may develop into a demand for permanent control.

The use of school children in such a project has several advantages. Continual efforts are being made to introduce subject matter of this kind into classrooms because of the educational value to children at this formative age when they readily absorb and retain information of future value to them. There is further advantage in having them acquire practical knowledge from actual experience that is half play. Further, such teen-age activities acquaint the youngsters with their future civic responsibilities and should help to make them better citizens. It, also, was noted that several school children living in the surrounding rural area participated in the preliminary training course and took back to the farms some knowledge concerning control of mosquito breeding.

Finally, there is the great mutual benefit to be derived from a closer association between the health department and the people it was created to serve. A health department and its bureaus are not austere and unapproachable organizations that can be called on only in an emergency. Anything that tends to break down such a barrier is of benefit to those on either side. The activity reported here has opened friendly relations, and it is believed that, because of this experience with mosquito control, the townspeople are much more ready and willing to seek advice and cooperation in connection with other problems.

A Statistical Record System in a Local Health Department

By BEATRICE PEARSON, Ph.B.

A director of health constantly wants two kinds of statistical information: first, data which will acquaint him with the health needs of the community; and second, figures showing the extent to which the divisions of the health department meet local requirements for service.

Such information can be obtained by analyzing birth and death certificates, reports of communicable disease cases, and reports of the activities of the health department.

The problem, then, is one of finding a technique for handling available source materials so as to provide the most satisfactory statistical reports.

The Louisville and Jefferson County (Ky.) Board of Health introduced a new reporting method January 1, 1948, while Dr. John J. Phair was director of health. Although the basic procedures are established, the details are still changing and expanding to meet the needs of a growing program. It is thought, nevertheless, that the Louisville experience with the new system will be of value to others engaged in the administration of health programs.

Background

The Board of Health of Louisville and Jefferson County has jurisdiction over the county tuberculosis sanatorium, the city hospital, and the department of public health. The depart-

ment of public health serves the community with the usual activities of a health department, including venereal disease clinics, well-child and maternal health clinics, school health services, a general program of public health nursing services, and sanitation, milk, and meat control services. Medical and nursing services are administered through six districts, three having health centers. Well-child clinics are located in 33 other sections of the city and county. A mobile unit covers less accessible rural areas, and a dental trailer serves the towns and rural communities. Preparation of vital statistics is also the responsibility of the department of public health.

Prior to January 1, 1948, all activities of the department of public health were reported in terms of the activities report code adopted in 1936 by the Public Health Service; the Children's Bureau, and the State and Territorial Health Officers (1).

When the activities report code was adopted, many health departments kept few, if any, records. Public health personnel in small communities remembered the history of each case. To convince them of the necessity of maintaining records was difficult. This was especially true of statistical records.

The activities report proved valuable in overcoming this attitude, and it played an important role in training public health workers to maintain and use statistical data. But, as public health activities were centralized in health departments, with a broad concept of public responsibility, serious weaknesses were seen:

1. The activities report gave only a frag-

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mentary idea of the total program of the health department. Since pieces overlapped in some places, and gaps appeared in others, it was impossible to put together a comprehensive picture of the whole.

2. The work of a single division was inadequately summarized. Child health service, for example, was divided into service to infants and service to preschool children. Each of these services was again divided into medical and nursing service. The number of children served was not known, nor was there an accounting of the work actually done for the children in the well-child clinics. There were no correlations—no analysis was made of the relation between any two sets of data (2).

3. The code was too rigid. There was no effective way of working into the code changes in the program or additions to the services offered. As a result, many of the department's activities were incompletely reported.

4. There was no possibility of avoiding errors, or of finding them. Each staff member—doctor, nurse, or sanitary inspector—turned in a daily report in code. The daily reports were entered on monthly sheets and totals for each worker were compiled for the month. These totals were then carried forward to a "district summary sheet," and totaled for the district. District totals were carried forward to a "department summary sheet," and totals compiled for the entire department. Because the entries were in code, the original daily reports could not be checked for accuracy. Errors in copying totals did not become apparent because, again, these were in code. So there were no internal checks, and no cross-checking of totals.

5. Special studies, desired from time to time, were outside the framework of the activities report, and could be made only with the application of much time and labor.

The Louisville Card System

The activities report code was discarded in Louisville. A new code was introduced for use on a standard mechanical tabulating card. Each card represents one encounter between an individual and a health department representative. The card carries important facts about the person. It also shows all services received at each

clinic visit, home visit from a public health nurse, or sanitary inspection. The cards include all information formerly obtained from the activities report, and, in addition, a quantity of other data is readily procurable (3).

By using the mechanical tabulating card, it is possible to ascertain the total number of individuals served by the department for any time period; to learn their age, sex, and race, as well as place of residence. Any desired details about the work can be obtained, with special studies whenever necessary. Routine monthly reports include attendance at each type of clinic, showing the reason for the visit, and a count of the services received (physical examinations, immunizations, blood tests). Since each card contains information on every service received, the number of each kind of service shown on the monthly report is the actual count of services.

Information for special reports is available. There were, for example, more than 40 centers in Louisville and Jefferson County where child health conferences were held, some semiweekly, some monthly. After studying attendance at each center, using total attendance tables on infants, preschool and school-age children, and the number of new cases in each category, it was decided to decrease the centers to 35, to reduce the frequency of sessions at some, and to institute an appointment system to reduce the number of repeat visits by older children. Data for this study were easily obtainable: a code number for each center, as well as the necessary information on the children, is punched into every card representing a visit to a child health conference.

A tabulation made of nursing visits to new prenatal patients showing census tracts where the patients lived is another illustration of a special study. The study was used to determine where a new prenatal clinic would be of most value.

To obtain an accurate record of the incidence of disease, it has been the custom to count every attack as a new case. At a staff meeting, it was suggested that the high incidence of gonorrhea might be due not so much to an increase of infection as to a repetition of infection among a comparatively small group of people. To discover the truth, the statistical department suggested that the venereal disease clinics count as "new re-infections" any newly diagnosed cases pre-

viously reported as infected. A new code number was added to include a count of such cases with the result that monthly reports show not only the "new re-infections" of gonorrhea but also the occasional "new re-infection" of syphilis.

As the work of the divisions expands, the codes used are changed, and additions are made. The system's flexibility was illustrated when a new series of preventive antigens was introduced in the well-child clinics. When the change was made, the tabulating card code for immunizations was completely revised without disturbing the nurses or clerks. All cards are coded in the statistical office.

Mechanical tabulating cards are used for recording vital statistics. Resident and nonresident births and deaths are recorded on tabulating cards. From the cards reports of death causes can be made by age, sex, and race, and by residence. Births can be shown by age, race and sex, and residence of mother. Infant death rates in the city can be computed by census tract, and the causes of infant deaths can be shown in detail. Other studies can be made as desired. The new International Statistical Classification of Diseases, Injuries, and Causes of Death was adopted in 1950 by the Department of Public Health in Louisville and Jefferson County. Each death was coded, then, according to both the old and new classifications. Tables were presented according to both, for comparison with previous years as well as with future years.

Preparation of Source Material

To show best how results were obtained by the department of public health in Louisville and Jefferson County, it might be well to describe the steps taken in the gathering and tabulating of source material. Too many statistical studies and reports have been invalidated by carelessness in treating the original data. In order to insure the closest homogeneity of material, careful definitions of terms were established before the new method was instituted. Wherever possible, the definitions of the activities report code were retained, but they were clarified. New terms were introduced after definitions were agreed upon by the statistician and

doctors and nurses, or by the statistician and sanitary engineer. Once established, the definitions are adhered to and have universal application. As borderline cases occur, the defined terms may be expanded to include the new problem.

New staff nurses undergoing orientation visit the statistical department for instruction on the work under way. All staff members concerned with the records are encouraged to discuss the clarification of definitions with the statistical department. Every effort is made to keep source material accurate and uniform.

Home visits of public health nurses and field visits of sanitary and milk inspectors are recorded in the field directly on the tabulating card. Clinic visits are recorded on the "daily register and service analysis sheets" of the clinic. For each visit shown on the daily register sheet, a card is punched, similar to that used for the home nursing visit.

The card carried in the field by the nurse is precoded so that she has only to check an item beside the code. When a patient visits a clinic, his name, age, sex, and race are recorded on the daily register sheet. The clinic clerk locates his name in the master index card file, where, if he is a former case, a card is kept with his case number at the top. This number is entered on the register sheet. At the end of the day, the clerk numbers the new cases and prepares an index card on each for the master file. The clerk reviews the medical record of each patient, entering on the register sheet the services rendered the patient, such as X-rays, blood tests. Daily register sheets are prepared in duplicate; the original is sent to the statistical office; and the second copy remains in the clinic where it becomes an important source record.

Statistical Procedures

When the field visit cards and clinic registers are received in the statistical office, receipt is recorded on a check sheet. Then they go to the code clerk who checks for obvious discrepancies. Birth dates in the well-child clinics are given special attention so that the categories "infant," "preschool," and "school-age" will be correctly marked. The code clerk then codes all items not precoded. After the sheets have

been coded, they go to another staff member who checks for coding errors.

Field visit cards and clinic register sheets next go to a key-punch operator where a card is punched for each visit recorded on the register sheet. When the cards are completed, they go to the verifier who repeats the card punching as a check on the first operator.

Care in securing the accuracy of the original data is emphasized. The foundation of this accuracy lies in the reports prepared by nurses, sanitary inspectors, and clerks. The value of the final reports rests on the accuracy of the original material. Every effort is made by the statistical department to guarantee that the information will be tabulated as received.

Procedures for Sanitation Reports

The reports of the sanitation division are treated somewhat differently from those of the nursing division, although the underlying method is the same. Because of the complexity of the activities of sanitary and milk inspectors, it was impossible to devise a precoded card, or to have the coding done in the statistical office.

The sanitation code was set up in four parts: A. Type of premise, B. Origin of inspection, C. Problem to be investigated, and D. Action taken. The card has a space for each of the four code sections, and every field visit must be coded for all four. The inspector codes his own card, attaching it to his report. After reviewing the report, his supervisor sends it to the sanitation division's code clerk, who works in close cooperation with the statistical department. Her task is to check the code against the inspection sheet for correctness and consistency. For example, if a visit is coded as an "official call" in "B," it cannot be coded as "general inspection" in "C."

When the cards have been received in the statistical office, their receipt is recorded; they are key-punched and verified. Because only a few columns are necessary to record a sanitation or milk visit, the card has been set up as a "tumble card," and can be used again.

Preparation of Reports

For the monthly reports, all cards are run through a card-counting machine which sorts

them into pockets, according to the holes in the column on which the sort is made, and counts the number of cards in each pocket. After the first sort, each group of cards can be re-sorted on another column, and again re-sorted, so that a detailed correlation table can be obtained if desired.

Types of correlation tables are illustrated in tables 1 and 2. All data for table 1 were obtained by sorting the same cards according to different categories. In table 2 will be seen one of the many counts obtainable from the cards—in this instance, a correlation of sanitation services from the sanitation cards will provide valuable information to the administrators of a sanitation division in a health department. For sample correlation tables, as in table 1, the totals must be counted two ways: to obtain clinic visits by classification the cards are first sorted by "type of visit," and then each group is sorted by "classification." The figures obtained in this sort must add to the figures obtained when all of the cards are re-sorted by "classification." If a number has been put in the wrong cell, the error will be found, where merely checking the arithmetic cross totals would not have revealed it.

By placing all work on mechanical tabulating cards, each one representing one visit—to a home, to a clinic, or as an inspection—the department of public health can obtain from the first card sort totals unobtainable from the activities report. From these totals a summary of the work of each division is made as soon as the reports for a given month have been received and processed. By sorting the home visit and clinic cards by case number, it is possible to know how many individuals have been served by the health department.

Upon completion of the summaries, any information desired can be obtained by re-sorting the cards. The fact that a patient is new to a clinic, for example, is punched into the card, and this punch will always count as one new patient whether the cards are sorted by classification, by separate clinics, by X-ray services, or for any other category. Since a clinic service, such as urinalysis, is punched into the card representing that clinic visit, the total number of such services counted on the card-counting sorter must be the actual number reported by the clinic.

The number of individuals given any particular service, such as field visits for prenatal care, can be obtained by counting the "new" and "first this year" visits. When the cards have been sorted by case number, the number of cards bearing one case number represents the number of times that case was served by the department of public health. Similarly, to get the number of premises served by the sanitary inspectors, the number of "applications" and "first inspections" can be counted. By relating this number to the total inspections made, the average num-

ber of inspections per premise can be obtained. This can be done for total premises, or only for premises of a certain type, such as restaurants or nursing homes.

As the work of the health department expands, new code numbers for new services are added to the key-punch code.

In the sanitation division, "type of premise" is coded in 2 digits, the first representing the broad classification into which a premise fits. For example, all numbers beginning with "1" represent premises on which food is served.

Table 1. Report of Tuberculosis Clinics, October 1949

[Sample correlation tables]

Clinic visits by classification	Total visits	Type of visit		
		New cases	Old case (first visit this year)	Subsequent visits
All classifications.....	2, 639	1, 054	449	1, 136
Active.....	130	24	10	96
Inactive.....	270	2	34	234
Suspects.....	33	2	1	30
Contacts.....	400	95	82	223
Other forms of tuberculosis.....	3			3
Other pulmonary disease.....	43	7	3	33
Negative.....	564	19	159	386
Not diagnosed.....	524	437	18	69
Case finding.....	672	468	142	62
Attendance at each clinic				
Total at all clinics.....	2, 639	1, 054	449	1, 136
Waverly Hills clinic.....	2, 204	962	384	858
West End clinic.....	67	28	18	21
Central Louisville clinics:				
Diagnostic.....	321	62	47	212
Pneumothorax.....	47	2		45
Type of service at each clinic				
	Total	Waverly Hills	Central Louisville	West End
X-rays.....	619	410	196	13
Fluorographs.....	1, 222	1, 222		
Total X-rays and fluorographs.....	1, 841	1, 632	196	13
Active cases.....	54	41	8	5
Inactive cases.....	128	93	30	5
Contacts and suspects.....	260	214	45	1
Other diagnoses.....	740	625	113	2
Case finding.....	659	659		
Fluoroscopic examinations.....	614	323	229	62
Mantoux tests.....	21	8	13	
Pneumothorax treatments.....	46		46	
Physical examinations.....	71	32	38	1

Table 2. Action taken on complaints by problem to be investigated (sanitation division)

Action taken	Total complaints	Buildings	Plumbing and water supply	Sewage	Surroundings	Rat control	Other nuisances	Rabies control	General inspection visits	Non-inspection visits
Total complaints	212	10	32	36	65	2	25	30	3	9
Total actions taken	214	10	33	36	65	2	25	31	3	9
Reinspection recommended	22	2	3	5	6		2	2	2	
Referral recommended	9	1	1	1	3		3			
Action regarding water and sewage	2		1							1
Order issued	101	2	11	14	42	2	6	24		
Condition abated	6		3	1	2					
Instructions given	28		9	3	3		4	4	1	4
Survey and report	6		1	4	1					
No cause for action	32	3	3	7	8		10			1
No response	8	2	1	1				1		3

The second code digit represents the specific kind of premises, as "11" means restaurants and cafeterias, and "12" means school cafeterias.

Much information is available from the cards which will not be tabulated monthly. The "daily register sheet" for the prenatal clinics has a space for toxemia symptoms. These are coded and punched routinely, but are tabulated only every 6 months. If a special study is desired for which the information is not on the cards, new codes can be devised for the required information, and within a short time the study can be made. When the tabulating cards are at hand, moreover, they can serve other purposes.

Variations of the System

Health departments in smaller communities may feel that their workload does not justify using a mechanical tabulating system.

The same results are possible by hand-recording the information on file cards, and sorting and counting the cards by hand. Since human error is more frequent than mechanical error, all internal checks of the material should be carefully made, and, if possible, two people working independently should complete the analysis.

There are key-sort cards available with holes punched around the edges, each hole or group of holes labeled for specific information. A hand or mechanical punch cuts out a V at the

point for the relevant datum, and when a long needle is plunged through a group of cards at that point, and the cards lifted on the needle, those with the V cut-out remain in the sorting tray. After the sort has been made, the cards can either be counted by hand or run through a counting machine.

A card-counting sorter like that used in Louisville may not be adequate for tabulating cards in larger communities. However, similar cards may be run through a printing tabulator after they have been sorted on one major classification. That machine counts the cards according to the desired correlations and prints the results.

The new electronic tabulating printer is even more adaptable. Also, there is a "mark-sensing" card which is filled out with a heavy graphite pencil and then run through a machine for automatic punching. The mark-sensing card does not have, however, the same room for expansion and variation available on an ordinary tabulating card.

The particular tabulating method chosen by any health department will be determined by the use intended for the material. One weakness of the activities report code was that it attempted to set up a uniform code to satisfy the requirements of all health departments, regardless of size. But each health department serves its community according to need, and just as the needs of communities differ, so too will the methods of satisfying those needs.

Summary

The statistical reports which are prepared in the Louisville and Jefferson County Department of Public Health are far more than mere counts of activities. Instead, they represent an analysis of the services provided by the health department to the citizens of the community. Just as the financial statement of a business enterprise shows the performance of its various departments, so the statistical reports of the health department show the functioning of its divisions. These reports are indicators pointing out changing situations and directing toward developing needs. They are, in the fullest sense, aids in planning and evaluating the program of the health department. They are all of these things because they are based on a unit card, one which includes only one unit of activity and carries the complete story of that unit of activity. The same card contains all requisite information about the

characteristics of the individual served as well as full details of the services given. From such cards, it is possible to obtain full and accurate reports.

The author will supply copies of the tabulating cards and of the daily register and service analysis sheets to those needing further details.

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Vocational Rehabilitation for Civilians

An average \$457 was spent in the fiscal year 1951 on each handicapped civilian helped under the State-Federal vocational rehabilitation system, according to the recent annual report of the Office of Vocational Rehabilitation, Federal Security Agency. A total of 86,000 disabled men and women left beds, sickrooms, and wheelchairs under this 31-year-old program and took self-sustaining jobs. In addition, another 13,000 received all necessary medical help, guidance, and training and were ready to work at the right job.

Last year the States contributed over \$9 million to the rehabilitation program; the Federal Government, \$21 million. A study in 10 of the States indicated that about 20 percent of the disabled receiving specific training are being prepared for defense work.

Alcohol Studies and Rehabilitation In Virginia

By KENNETH F. LEE, M.A.

Encouraging evidence that a large percentage of chronic alcoholics can be successfully treated is found in the Virginia State Department of Health program for the study, treatment, and rehabilitation of alcohol addicts.

A recent evaluation of 816 treated patients showed that more than half had been helped to attain sobriety; about one-fourth showed marked improvement; and less than one-fourth showed no improvement.

The State program was established in 1948 by legislative action of the General Assembly of Virginia to determine if State aid can help persons addicted to the excessive use of alcoholic beverages. The program was not set up with the intention of solving the entire problem of alcohol addiction in the State.

Virginia's program on alcoholism is the culmination of the efforts of a number of citizens of the State, aided and advised by nationally recognized authorities on the treatment of alcoholism. The enabling legislation is among the first to assign to a State public health authority the administration of an act to combat alcoholism.

A study of alcoholism within the State provided the basis for developing the program. A research group, the Virginia Advisory Legislative Council, was authorized by the Virginia General Assembly in 1947 to make the investi-

gation and report back to the assembly 60 days prior to the convening of the 1948 session.

Size of Problem

Admissions of alcoholics to penal institutions were surveyed by the research group during the 4 years July 1, 1943, to June 30, 1947. Of the 70,077 jail commitments in the 1944 fiscal year, 29,116 were attributed to alcohol. By the end of the fiscal year 1947, the total of all arrests had increased to 98,034, and the total arrests on account of alcohol were 52,820. Thus, arrests for inebriation increased 81.4 percent during this short period. During the same period, arrests for drunken driving increased 119.3 percent.

Another aspect of the study concerned the number of first admissions, from 1910 to 1946, to the four Virginia State mental hospitals. Inebriates made up 13.7 percent of all first admissions during this period.

The records of three private mental institutions which admitted alcoholics furnished information on the number admitted during a 10-year period, and the records of a fourth were available for a period of 5 years. The average number of first admissions of inebriates to the four private institutions was slightly more than 500 persons annually, the advisory council found.

An estimated number of 15,000 inebriates and 45,000 excessive or problem drinkers in the State was derived from studies made available by the Research Council on the Problems of Alcohol of the American Association for the

Mr. Lee is director of the division of alcohol studies and rehabilitation in the Virginia Department of Health, Richmond, Va.

Advancement of Science and the Yale Study Group of New Haven, Conn.

Legislative Action

The resulting legislation, Senate Bill 304, created the division of alcohol studies and rehabilitation within the Virginia State Health Department. The new division was given the assignment of studying the problem of alcoholism, treating and rehabilitating alcoholics, and promoting a preventive and educational program.

Hospital and clinic facilities for alcoholics accepted for treatment have been established by the Medical College of Virginia within the college hospital, as authorized by the act.

Under the law the director of the division, subject to the approval of the State health commissioner, may set up other treatment facilities in the State, within limitations of the appropriation.

To finance the program, the assembly appropriated \$116,525 for the fiscal year 1950-51 and \$117,325 for the year 1951-52. As a supplement to the official grant, patients who are able must pay the actual cost of their hospital care and treatment. In the administration of the act, it has proved feasible to have the patient pay at least part of the cost if he cannot afford the entire expense.

In planning the program, the Virginia State Health Department, as directed by the act, has sought the help and advice of established agencies in the country. Among the advisory agencies have been the Connecticut Commission on Alcoholism and the Yale Plan Clinic, the alcohol clinic of the Peter Bent Brigham Hospital in Boston, Mass., and the Payne Whitney Clinic of the New York Hospital and the alcohol service of the Knickerbocker Hospital, both in New York City.

Organization

Two standing advisory committees have been designated to aid the division of alcohol studies and rehabilitation.

The medical advisory committee has nine physicians representing the specialties of neuropsychiatry, internal medicine, and pharma-

cology. Seven are from Virginia and two from outside the State. The tenth member of the committee is a sociologist. This committee meets on call by its chairman and has contributed much to the organization of the division's activities and treatment procedures.

On the general advisory committee are eight persons representing the fields of education, religion, social service, private business, and organizations particularly interested in the social problems of alcoholics.

The staff of the division has a full-time administrative director who is responsible for the operation of the program, a medical director, and three physicians who are employed on a part-time basis. In addition, there are two psychiatric social workers and a clerical staff of five. The services of a clinical psychologist are used when psychological studies are needed.

Treatment

An out-patient clinic was established October 16, 1948, at the medical college hospital, and the in-patient facilities opened April 12, 1949.

At the end of January 1952, a total of 1,048 patients had been accepted for treatment—171 were initially accepted on an out-patient basis; 877 began treatment in the hospital.

Of the 1,048 patients, 138 were women and 910 were men. They have come from 64 of Virginia's counties and 21 of its towns and cities. Most of the patients have been between the ages of 36 and 40. The second largest group has been between the ages of 31 and 35. Only 17 patients have been less than 25 years old.

Admission

Eligibility for treatment is suggested by the act. Any citizen of the State who has become unable to care for himself through the excessive use of alcoholic beverages, or who is a burden to the public, may voluntarily request admission to the treatment facilities.

No patient is accepted for treatment against his will. But he may be referred by relatives, friends, ministers, physicians, social agencies, the courts, members of Alcoholics Anonymous, or by employers.

The limited facilities make it impossible to

accept all persons who apply. However, an effort has been made to select patients who represent various alcoholic problems with respect to age, sex, race, occupation, marital status, family background, and drinking patterns.

Unless the patient is in an acute alcoholic state at the time of admission or is in need of special diagnostic studies or treatment requiring hospitalization, his course of treatment begins in the clinic with an application interview.

A member of the staff tells the patient the general purpose of the clinic and orients him in the regime of treatment.

He is told that the clinic does not expect to give him a treatment lasting a few days or weeks. He learns that successful rehabilitation requires that he adhere to a prescribed, long-range treatment program administered by physicians, psychiatrists, social workers, and psychologists.

All treatment is prescribed and supervised by the medical director or by a staff physician assigned to the patient.

Special Services

All patients accepted for treatment are given a complete medical examination, and each of them undergoes an examination by a psychiatrist. A social history is taken and a psychological test is made if the physician in charge believes they are advisable.

Occasionally the physical examination will reveal a physical ailment that is influencing the patient's desire to drink—a condition that must be treated if the patient is to overcome his drinking problem.

Psychiatric guidance is an important part of the treatment. The patient's work with the psychiatrist, which often begins in the hospital, continues during visits to the out-patient clinic. During the sessions, the patient can discuss his difficulties with someone who does not condemn him, and who can often help him gain insight into his problems and guide him into better management of his life.

The social history, gathered by a medical social worker, provides information the staff members may use in understanding and helping the patient with any problems he may have in his family, social relationships, or employment.

It has often been necessary to work with a patient's husband or wife, or other relatives, and the patient's employer to learn more about his condition and to help members of the family as well as the employer to accept some of the patient's limitations.



Staff members hold frequent conferences to consider the patients' applications, records, and progress during treatment, and to develop appropriate treatment procedures. Shown are the medical director, psychiatric social workers, administrator, and staff secretary.

Psychological tests provide information about the patient's intellectual capacity and personality that is valuable in planning treatment and in determining whether he is suited to his present job.

After the testing is completed, a plan of treatment is developed for each patient, taking into consideration his own particular problems, capacities, and limitations.

Every patient who is physically and otherwise qualified is given an opportunity to volunteer to take the drug Antabuse as a part of his treatment plan. Antabuse is started while the patient is still in the hospital, and he continues its use daily while under supervision as an out-patient.

Follow-Up Treatment

A vitally important phase of the program is the follow-up treatment which all patients receive whether they begin treatment in the hospital or on an out-patient basis. This follow-up care covers a period of months and for some patients has continued for more than a year. Some patients have traveled more than 400 miles (round trip) to continue treatment.

Recently an out-patient service has been opened at Roanoke, Va., a city of about 100,000

population 165 miles southwest of Richmond. Patients making application at this clinic may be referred to the hospital facility at Richmond for treatment, or they may receive treatment on an out-patient basis at Roanoke, depending on their needs. This clinic reduces the distance a number of patients from this area of the State have had to travel to obtain the important follow-up treatment after leaving the hospital.

Employment Adjustment

Cooperation of employers has made possible many suitable work adjustments. During the past 3 years, the division has assisted more than 300 patients with their employment problems. Each staff member looks upon this aid as a part of his service to the patient. Sometimes the assistance consists of a talk with a previous employer. On other occasions, it has been necessary to make arrangements for employment in an entirely new field. Conferences with employers have led to other referrals for treatment by employers who wish to retain the services of a valuable man. An employer may seek aid for a skilled worker with many years of experience who is beginning to build up a serious record of absenteeism, particularly during the early part of the week. The return to useful, self-satisfying, remunerative employment is one of the worth-while services that may be provided the alcoholic.

Experimental Research

Concurrently with the treatment of alcoholic patients, a basic experimental research program has been inaugurated through the assistance of the professor of pharmacology and the research professor of biochemistry at the Medical College of Virginia. Two full-time research assistants are conducting the studies. Under study are (a) the effects of alcohol on cholesterol metabolism; (b) the effects of alcohol on carbohydrate and fat metabolism; (c) the possible detrimental effects of alcohol on the production of fatty livers; (d) basic experimental studies dealing with methods of treating acute alcoholic intoxication; and (e) the effects of environment and various commonly used drugs on the pharmacological action of alcohol.

These experimental studies sponsored by the division at the Medical College of Virginia are a part of the pioneer activities in this field now being conducted throughout the country.

Educational Activities

The preventive or educational aspect of the program is another important phase of the work. However, during the first several years the division has emphasized rehabilitation in order to obtain concrete evidence that alcoholism is a remedial condition. Although the



During daily group sessions, staff members explain technical aspects of alcoholism and the patients discuss some of the factors that led to their illness. The sessions include movies with appropriate discussion of the film before and after the movie.

limited facilities of the service have made an intensive educational program impractical, several educational activities have been developed. Members of the staff have spoken before numerous groups. Scientific articles have been printed and distributed. The March 1951 issue of the Virginia Health Bulletin, published by the Virginia State Health Department, was devoted to the activities of the division, and copies have been sent to other States, to all public schools in the State, to physicians, social workers, and others interested in the alcohol problem.

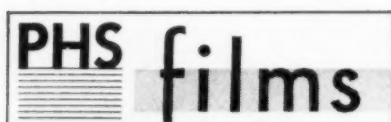
Possibly the most important activity is the annual symposium held by the division. Addresses presented by national authorities at the several sessions have been both beneficial and interesting to those concerned with the alcohol problem.

Program Appraisal

An appraisal of the results of treatment for the 3 years the division of alcohol studies and rehabilitation has been in operation is difficult. However, an evaluation of the therapeutic results for 816 patients made at the end of October 1951 showed that 57.2 percent have been helped to attain sobriety. Patients in a second group, 22.5 percent, have shown improvement in family relationships. They have lengthened their

periods of sobriety, and their employment situation is considerably improved. Persons in a third group, 20.3 percent, have, so far as can be determined, shown no improvement.

These results during the first 3 years of the division's activities appear to confirm the opinion of the State legislature that a large percentage of chronic alcoholics can receive benefit and make improvement in interrupting their drinking patterns through a program of rehabilitation.



Fears of Children

16 mm., sound, black and white, 30 min., 1951.

Audience: Teacher, parent, and child study groups.

Available: Loan—Inquire State health departments. Purchase—International Film Bureau, Inc., 6 N. Michigan Ave., Chicago 2, Ill.

Part of the series, "Emotions in Everyday Living," this film was prepared for the Oklahoma Department of Mental Health by the Mental Health Film Board and produced by Herbert Kirkow Productions. It has been approved by the National Institute of Mental Health, Public Health Service.

The film dramatizes some of the emotional problems common in childhood by telling the story of a 5-year old youngster, Paul, and the part that fear plays in his development. These fears—of the dark, of being alone, of new situations—prevent him from enjoying experiences



other boys enjoy. They create tension and anxiety between the boy and his parents, who have unintentionally accentuated the boy's problems by being both overprotective and unduly severe.

Paul's difficulties come to a head while he is exploring a cave with a friend. Paul reaches a state of panic. Alarmed, his mother talks this episode over with another mother and begins to understand how some of her own actions have contributed to her son's problems.

On another occasion, Paul is engulfed in a terrifying dream. His father, in questioning his own part in creating some of Paul's disturbances, learns to see the child's fears in a clearer light, and becomes better prepared to help the boy develop healthy mental patterns.

Farewell to Childhood

16 mm., sound, black and white, 23 min., 1951.

Audience: Appropriate teacher, parent, and child study groups.

Available: Loan—Inquire State health departments. Purchase—International Film Bureau, Inc., 6 N. Michigan Ave., Chicago 2, Ill.

This film is part of the series, "Emotions in Everyday Living." It was prepared for the North Carolina Board of Health by the Mental Health Film Board, and produced by the Julien Bryan International Film Foundation. It has been approved by the National Institute of Mental Health, Public Health Service.

"Farewell to Childhood" develops, in dramatic form, the story of Susan



Stewart, a normal teen-ager, and the difficulties she and her parents have in coping with the changes taking place in Susan's outlook and attitudes as she leaves childhood and enters adolescence. The girl longs for the independence and privileges of adulthood, but at the same time she fears them.

Her parents are bewildered by their daughter's behavior and her growing antagonism to their supervision. The inability of the parents and the girl to understand one another reach a climax when Mr. and Mrs. Stewart confront Susan as she returns late from a party one night and embarrass her and her escort with accusations and mistrust.

The girl withdraws from them, finding refuge in daydreams and in her admiration for her school counselor, which further distresses her parents. An approach to the solution of these difficulties is achieved when the counselor visits Susan's parents and helps develop in them a deeper understanding of their daughter's emotional "growing pains." A closer relationship between the girl and her parents results, making the thorny road easier for each of them.

Help Yourself to Health

Rural Health Factors

Rural health programs must go beyond efforts to attract physicians or to provide more and better medical care, the Seventh National Conference on Rural Health was told by John W. Cline, M.D., San Francisco, president of the American Medical Association. Farm people of America, who have always subscribed to the philosophy of individual independence, can develop a health program unequalled anywhere, he said.

"Americans always have believed that the individual must help himself to the limits of his own capacity," Dr. Cline stated. "By following this principle, and the broader concept of self-help through voluntary organizations of neighbors to solve community problems, we have grown strong as a Nation. This is the only method by which we can bring our rural health problem to adequate and satisfactory solution."

The AMA president urged the formation of community health councils, sparked by local community leaders. He outlined the farm health program:

- (1) More aggressive programs to inform farm people how they can solve their own health problems.
- (2) Construction of more and better hospitals in rural areas which need them and are able to support them.
- (3) Establishment of adequate dental facilities.
- (4) Efforts to attract physicians to rural areas.
- (5) Encouragement of voluntary medical and hospital insurance programs.
- (6) Improved sanitation, as an important factor in the fight against communicable disease.
- (7) Immunization against such preventable diseases as smallpox, diphtheria, and typhoid.
- (8) Education of farm

people concerning proper dietary habits in order to build healthy bodies and to avoid nutritional diseases. (9) Programs to teach home nursing and first aid—and even better selection of clothing for farm folks.

Citizenship Responsibility

The chairman of AMA's Board of Trustees, Dwight H. Murray, M.D., of Napa, Calif., in a pre-conference session, urged the busy rural physician to undertake the added re-

At the call of the Council on Rural Health of the American Medical Association, some 700 leaders in medicine, agriculture, and education met in Denver, February 29 and March 1, to consider rural health problems. Under the general theme, "Help yourself to health," the conference heard reports from communities which have taken active steps to solve some of their pressing health problems. Public Health Reports presents here, in news-summary form, several of the case reports and general statements for which written texts were available.

sponsibility of leadership in the rural health movement. Dr. Murray pointed out that the interest of rural people in better health is increasing. "Steps are being taken to provide more adequate health facilities in an increasing number of rural communities. Community health councils are winning growing recognition for solving rural health problems. Progress is being made in attracting more doctors into rural practice. There is growing employment of health education specialists by land-grant extension services."

Rural Health Progress

Physicians are again locating in villages, according to the chairman of the AMA's Council on Rural Health, F. S. Crockett, M.D., Lafayette, Ind. "No community is too poor financially to provide itself with good medical care provided it is rich in faith and good works," he indicated.

At a preliminary meeting of State rural health committees and agricultural educators, Dr. Crockett had stressed the importance of self-help techniques and health education allied with sound medical practice in giving rural America an equal opportunity to share in curative and preventive medicine. He underlined the physician's role in the development of State and local health councils:

"Doctors have proceeded vigorously, promoting State and county activities. We doctors are of the opinion that the leaders in any community must assume responsibility for the local state of affairs."

If a health council is formed of representatives of all groups, its deliberations will reflect a broad section of public opinion and experience. "The entire health problem of rural America is in process of solution," Dr. Crockett added. "It is our privilege and duty as doctors and as health educators to encourage this program of local health councils."

Local Problems Solved By Cooperative Effort

MISSOURI. Missouri communities are solving their health problems through their own cooperative efforts, according to Chester G. Starr of Jefferson City, Mo., director of the rural health service of the

Missouri Farm Bureau Federation.

Studies of health problems within the State are stimulated by the Missouri Health Council on which 27 state-wide groups are represented, comprising nearly all organizations having a fundamental interest in health improvement. County councils have been set up in 60 localities.

Mr. Starr's report cited two studies as examples of what is being done to meet local conditions: a nutrition project in Miller County and a diabetes survey in Greene County.

Miller County is in the Ozarks. The local health council decided to conduct a representative survey in the county of what people were eating to determine if their diets were nourishing.

"The results of the survey are now being tabulated," according to Mr. Starr. "From this data, the health council is planning to push better nutrition. With actual figures to be quoted, with results pictured in maps, charts, and folders, with illustrated slides, the story of what is now true in the county will be taken to every home and better systems of nutrition suggested."

In Greene County, the health council was concerned about a possible high incidence of diabetes and embarked upon a survey of the prevalence of that disease. With almost 1,000 volunteers participating, 11,960 tests were made, of which 309 were positive. Each of the 309 persons was advised to consult a physician for a final diagnosis. All but 70 did so, and of those who did not, a number had moved, making a check-up impossible. "Contrary to general belief, many cases were found among babies, grade school children, and teen-age high school pupils. Many of these were unknown until tests disclosed their existence," according to Mr. Starr.

The purpose of the State council is to bring together for discussions and planning all health groups, to serve as a clearinghouse on health problems and programs, and to facilitate joint planning on State and local levels.

A state-wide survey is now under way in Missouri, involving medical, dental, and hospital care for indigents. "The State council hopes to

keep driving along from one project to another, not 'biting off' more than can be 'chewed'," Mr. Starr asserted in his report. "We are hoping that the examples of county work cited, plus many others that are being accomplished in other areas, will continue to stimulate the many folks 'at home' who should be interested in better health. Missouri is getting to be a better place in which to live and in which to rear a family."

Communities Initiate Own Health Projects

MICHIGAN. Small communities in Michigan are creating healthful conditions for themselves, according to John R. Rodger, M.D., of Bellaire, Mich., chairman of the Michigan State Medical Association's Committee on Rural Medical Service.

"A study of community health programs reveals that to succeed each project must be sparked by and led by at least one person who gives it the highest priority of his time available for community activities," Dr. Rodger emphasized. In reviewing achievements in Michigan, he pictured what the people of a community can accomplish if they unite to solve their own problems.

Two years ago, the residents of Livingston County, one of the few areas not having a separate health department, formed a community-wide health council. A study indicated the need for immunizations and better sanitation in the rural schools. A project was set up on township levels with civic, local government, and professional groups co-operating and physicians and nurses donating their time. For its outstanding community program, the county council received last year's State health council award.

In strictly rural Newaygo County, the people united to promote voluntary prepaid health insurance, assisted by the churches, newspapers, and public-spirited citizens.

When the question of health services arose in Kalkaska County, population 4,500, the suggestion was made that a health center might attract additional professional services. This

viewpoint was promoted. The community now plans the construction of an 8-bed hospital. While locally owned, it will be sponsored by a larger hospital in a nearby trading center. Next summer, a young physician will move to the county.

A community health council was organized in Emmett County to improve sanitation and recreation conditions. The community's garbage dump was a health hazard. An unsupervised playground on the waterfront was dangerous for children. For its achievements in garbage disposal, sanitation, mental health, and child guidance, among other problems, the council received the 1950 State council award for the outstanding community health program.

Farm, Labor, and Industry Join in Health Campaign

NORTH CAROLINA. Physicians of North Carolina, appalled by health statistics which placed their State in the lowest national ratings, promoted a citizenry movement in 1943 which brought results, reported Fred C. Hubbard, M.D., of North Wilkesboro. Representatives of agriculture, labor, and industry joined in campaigning for better health facilities and services.

The North Carolina Medical Care Commission, a permanent State agency, was created by the legislature in 1945. That same year, the Good Health Association was formed, composed of more than 200 representative leaders. In 1946, a rural health committee was appointed by the State medical society to cooperate with the association. In 1947 and 1949, the legislature appropriated approximately \$20,000,000 as the State's share of funds for the Hill-Burton hospital construction program over a 5-year period.

"The tangible results of the health program in North Carolina are everywhere in evidence in the form of new hospitals, new health department buildings, the new 4-year medical school, more doctors in rural areas, more rural health councils, more evidence of health conscious-

ness than ever before, more effective medical and health service and more prepaid health and hospital insurance," Dr. Hubbard said. Increased funds—State and Federal aid, and local monies—have resulted in the construction of 60 hospitals, 19 health centers, and 15 nursing homes, with 3,907 new hospital beds.

The intangible results, Dr. Hubbard believes, are even more important. "I should like to suggest in this connection the feeling that exists subconsciously in the minds of those people who are really interested in better health conditions, that here is a wholesome and unselfish, and an all-embracing program with unlimited possibilities for good to the community. There is a changed attitude toward health matters that brings them down to the individual level and stimulates a wholesome and democratic approach to these common problems."

Medical Scholarships Attract Rural Doctors

VIRGINIA. To solve the problem of getting rural physicians, Virginia now provides 50 medical scholarships of \$1,000 each, reported Edgar J. Fisher, Jr., of Richmond, Va., director of the Virginia Council on Health and Medical Care. The scholarship recipient, in return, pledges a year of rural practice for each year the scholarship is held. The State has also made available 74 nursing scholarships and is being asked to provide 12 graduate nursing and 10 dental scholarships. Dr. Fisher noted that the dentist shortage is even more acute than the physician shortage.

The council includes 53 state-wide groups, 100 local organizations, and many individuals in its membership. It has concerned itself with such special problems as aid to crippled children, internships for Negroes, preventive medicine, nutrition, and hospitalization of indigents.

Since its inception 6 years ago, prompted by demand of the State's citizenry, the health council has, in addition to the creation of scholarships, supported these movements:

(1) A hospital construction pro-

gram which has resulted in 1 medical service center, 18 new hospitals, and 9 health centers, with others in planning stages. (2) The transformation of many beds in State tuberculosis sanatoriums from pavilion to hospital type. (3) The establishment of 11 tumor clinics and a bureau of cancer control in the State health department. (4) The establishment of public health services, doubling the counties previously covered. (5) The improvement and expansion of State medical education. (6) The improvement of the care of the mentally ill.

To encourage physicians to locate in rural areas, the council urges small communities to provide hospitals. Also, it has set up a placement service for putting physicians in touch with communities seeking physicians.

Dr. Fisher explained the functioning of the health council's placement service. "We contact the juniors and seniors in our two medical schools each fall to acquaint them with our service. We also follow the interns from the two schools as they leave the State, encouraging them to return and offering the facilities of our placement service to them. We contact the interns who come to our teaching centers from outside the State. By doing this and by having more information on locations readily available, we find doctors are much more apt to settle in Virginia."

University Recognizes Rural Training Required

COLORADO. More rural "family doctors" for Colorado is the result of a general practice residency training program at the University of Colorado's School of Medicine, in the opinion of Charley J. Smyth, M.D., of Denver, the school's director of graduate and postgraduate medical education.

After completing their residency, more than half of the trainees have settled in the rural areas of Colorado. A candidate for the special program must be a graduate of an approved medical school and have completed one year's approved in-

ternship. A 2-year course is provided for the young physician wishing to practice in a large community or as a member of a group where he will not be performing major surgery. For the physician who needs training in certain aspects of surgery, and who will practice in a rural area or do solo practice in a large community, a 3-year course has been prepared.

Because of the clear realization that graduate training had directed its emphasis toward the specialist, thereby contributing to the impersonalization of medicine and the disappearance of the general physician, the residency training program was established at the university.

"It was recognized that the far-reaching advances in scientific medicine were the results of specialists and that we would always need thoroughly trained specialists," said Dr. Smyth. But, he added, "It was equally apparent that there is still a need for a general physician interested in bringing these diverse special skills and knowledge together for the patient's benefit. With that understanding, the undergraduate curriculum was changed in 1947 to broaden the education of the medical student so that he would see in practice a type of medicine based on understanding the multiple factors which bear on human health and disease."

—Dr. Thode's Experience—

"One day, the thought suddenly struck me—why do I want to be a pediatrician?" Today, Henry P. Thode, Jr., M.D., is a general practitioner in Fort Collins, Colo. Five years ago, in 1947, he applied for a general practice residency at the Colorado University Medical Center and was accepted. The program was set up as a rotating service—including medicine, surgery, obstetrics, gynecology. Dr. Thode felt he had been marking time and getting nowhere as a potential specialist. Conversations with older and experienced doctors confirmed his opinion that general practice is the basis of all medical practice.

After additional training in Denver and Pueblo, Dr. Thode went to

Fort Collins, a community in northern Colorado. It was the turning point of his life. "Here, at last, I saw, and learned, and participated in the general practice of medicine. To put it mildly, I had no conception of just what general practice consisted. The volume, variety, and level of medical care in our community never ceases to amaze me, even today. I say 'our' community advisedly; because today, I believe I am a member in good standing in this community. I am in practice with an older doctor and gentleman. He did not know me, or I him, and yet we are partners today, an association of which I am extremely proud and for which I am very grateful."

Fifty Medical Students Train for Local Practice

ILLINOIS. The problem of a decreasing supply of rural physicians in Illinois is being met by a cooperative "Education for Need" program, instituted by the Illinois Medical Society and the Illinois Agricultural Association. Harlan English, M.D., chairman of the Illinois Medical Society's Committee on Rural Medical Service, told the conference. In assessing health problems and health achievements for his State, he interpreted Illinois' physician-shortage problem as one of educating the right people for the right places. Because of a decreasing population, he explained, actually no greater numbers of doctors and nurses are needed.

"In our State, a farm boy with dirt on his shoes, sunburn on his face, and lots of common sense in his head, but without a Phi Beta Kappa key or rich uncle, has trouble getting into our medical schools," Dr. English stated. This difficulty he attributes to "intensive competition to enter medical schools and the very, very difficult administrative problems involved, that apparently could be resolved, not solved, by scholastic ratings."

Dr. English described the efforts of the Illinois Medical Society and the Illinois Agricultural Association to identify those counties in greatest

need of medical replacements. Medical school authorities were then approached, he said, with the suggestion that "we, as a Loan Fund Board comprised of three representatives of medicine and three from the Agricultural Association, would contract with students having minimal averages but who were native sons of these most needy counties that in return for loans of \$1,000 to \$5,000 the students would be educated and returned to practice in their home counties only. We have 25 such students now in the processes of medical education and will have 50 more in the next 5 years."

Also, administrators of small "down-state" hospitals were approached, Dr. English reported, about educating nurses from localities where the need was greatest, with the specific contract that the nurses return to their home counties to practice nursing. If they married, they were to contribute sufficient funds to the nursing school fund to educate another nurse, he said. This program has been so well received, according to Dr. English, that it has enabled the smaller hospitals without nurses' training schools "to get by," and to have more and more bedside care performed by nonprofessional personnel with only 60-70 hours' training.

Illinois is blessed with many bounties, not the least of which is a good educational system, commented Dr. English. Its mortality and morbidity figures have never been the highest in the Nation, giving evidence, in his opinion, that its citizens are reasonably well-informed on health matters and have available reasonably competent health and medical personnel. New hospital beds—1,214 in 18 different towns where the need of additional facilities was urgent—have been built, with Illinois citizens raising two-thirds of the cost of construction under the Hill-Burton program.

What has Illinois done about local health departments? Dr. English mentioned that 26 of its rural counties have established health departments after a referendum vote and that where personnel can be found to staff them, the work of these health units is satisfactory. "Basi-

cally, in our State," he said, "the local township clerk is the township health officer. Between the elected officials, the school administrators, and the members of each county medical society, most of the health problems of public character are discussed, the citizens advised, and a proper public action is taken. Some say this system is archaic, but in Illinois it seems to work as well as the most expensive systems so far devised."

Dr. English further summarized local health achievements in Illinois by noting that grade A milk ordinances have been passed in most towns over 5,000; a brucellosis eradication program was inaugurated last year; 98 counties have enacted, by local option, tax measures to be used, if necessary, for tuberculosis control. A recent count, he said, showed that 17 cities had fluoridated their water supplies, and evidence collected so far reveals that "this simple chemical mechanism will decrease dental caries to such an extent as to be worth far more than the approximately 20 cents per family per year which the program costs."

"Such in brief is how the citizens of Illinois have improved their health status," Dr. English concluded. "The greatest single cornerstone or foundation stone in this improvement progress has been based on local community and county activity. It seems to us in Illinois that good health like good corn starts growing from the roots up and not from the tassel down."

Doctors Face Challenge In Small-Town Areas

SOUTH DAKOTA. Kenneth Kalsch, M.D., of Philip, S. Dak., gave those attending the Seventh National Conference on Rural Health a few simple rules to help a small town get and hold a doctor.

1. To obtain a doctor: Provide adequate hospital facilities and personnel, office space for a doctor to rent, and the type of town in which a person would want to live.

2. To keep a doctor: Treat him

as a human being with the same mental outlook and physical stamina as any other human being; try working with him instead of against him.

Dr. Kaisch spoke with the authority of personal experience when he stated that some small towns have more difficulty in keeping a doctor than in getting one. Minding the lot of a young doctor in a big city like Detroit a grueling one—he took up practice there after graduating from the University of Michigan Medical School—he selected a South Dakota

town of 900 people where there was no doctor within 26 miles.

His choice was not ideal from a doctor's standpoint. The hospital was a converted old wooden house, with a single room as the only available office space. Rental housing was available and the school system was good; improvements were promised and some of them were achieved. But, since practicing in a small town, Dr. Kaisch has compared notes with other physicians serving small communities.

Among the difficulties encountered is gossip. Another deterrent to service in small communities is the feeling that the city physician is better trained, with the result that the small-town physician frequently is by-passed except for emergencies or ordinary ills. Small-town physicians are on call 24 hours a day.

"If the townspeople only would regard their doctor in the same light as themselves, many small town practitioners would not go to an early grave," Dr. Kaisch advised.

PHS publications

Cancer Nursing In the Basic Professional Nursing Curriculum

In response to requests from instructors, this publication was developed by a Cancer Nursing Content Production Committee made up of representatives of nursing education and nursing services. It was designed to provide an outline showing how cancer nursing training might be incorporated into the basic professional curriculum and to suggest content materials which would be useful in preparing students to give skilled nursing care and to know and understand the etiology, symptoms, diagnosis, and treatment of the disease and the rehabilitation of the patient. The outline suggests the problem solving approach, and may be expanded or limited as necessary to integrate it into the basic curriculum.

The monograph discusses the cancer problem, the place of and need for expansion of cancer nursing in the curriculum, the roles of teacher and student, and problem solving. The suggested outline for teaching covers the nature of cancer; prevention; detection and diagnosis; treatment and nursing care; rehabilitation, including the patient and the rehabilitation process, resources, and programs; and the concepts of cancer

control. Two illustrations of problem solving in teaching cancer nursing are given: (1) for breast cancer and (2) for cancer of the rectum and colon with a colostomy. A sample cancer survey form and a bibliography of 113 references are included.

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Cancer Nursing in the Basic Professional Nursing Curriculum—Suggested Content and Methods by Cancer Nursing Content Production Committee. (Public Health Service Publication No. 147) 1951. 27 pages. 5 cents.

Mental Health Pamphlets And Reprints Available For Distribution, 1951

This is the third edition of the catalog of current mental health pamphlets, first published by the National Institute of Mental Health in 1949 to fill the need for a standard reference guide to mental health materials. The 1951 edition contains 300 new items which are classified under the following main headings: National Mental Health Program, Mental Health Information for Professional Personnel, Mental Health Guidance, Mental Health Problems, Mental Health Services, Study Programs and Group Activity. Each of these sections is broken down into appropriate subheadings.

The references are not annotated, although the price of each pamphlet,

when known, is given with the source of the material.

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Catalog of Mental Health Pamphlets and Reprints Available for Distribution, 1951. Public Health Bibliography Series, No. 2 (Public Health Service Publication No. 19, third edition) 1951. 53 pages. 25 cents.

The Public Health Nurse In Your Community

Designed as a recruiting aid, this publication describes the activities of the public health nurse and outlines the organizations which employ nurses. Qualifications, needs for nurses, and opportunities in the field are also covered.

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The Public Health Nurse in Your Community. (Public Health Service Publication No. 47) 1951. 13 pages; illustrated. 10 cents.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Nutrition for the Later Years of Life

By ANCEL KEYS, Ph.D.

"Nutrition for the later years of life" implies that older people have special nutritional problems simply because they are older. The suggestion is that dietary practices considered good for younger adults may not fit precisely the needs of older people. Actually, there is practically no evidence that age, by itself, produces nutritional problems which do not have their counterparts at all ages in adult life. However, the frequency of certain problems changes with age and there are some general trends which need attention from those who advise or care for elderly persons, as well as from the elderly person himself.

It is impossible to specify any particular age to which this discussion applies, or begins to apply. Physiological age and a mode of life cannot be predicted from age in years alone. A part of the "old age problem" in the United States is the result of an overemphasis on years as a measure of biological status.

We are concerned here with individuals who have definitely reached the period of a substantial decline in physical vigor and activity, who have established relatively rigid patterns of food habits, and whose life experience has allowed the accumulation of some of the infirmities we associate with old age. For the individual, this age may start at 40 years, or it may be postponed to 70 or more; commonly, it is reached in the sixties.

There is no specific nutritional problem in old age nor any specific dietary recipes for the pres-

ervation of vigor or the extension of life in the aged. Throughout history and in all parts of the world, special diets—foods to eat or not to eat, foods in particular combinations or sequences—have been offered to a wishful and gullible public for the prevention or "cure" of the changes in physical and mental capacity associated with growing old. When there is an abundance of food, as there is in the United States, the scope for the food faddists is unlimited.

Part of the problem of providing nutritional help for older persons consists in countering the claims of the food faddists, the purveyors of special nostrums offered for nutritional purposes, and the writers who find a ready sale for books and articles promising miracles from peculiar diets. The older person who observes deteriorative changes in himself is especially vulnerable; the greater the loss of the sense of well-being, the stronger is the urge to believe any promise of help. Some highly publicized diets and nutritional "treatments" may be harmful, but the majority are not really dangerous. The main objection to false propaganda about nutrition is that it interferes with the teaching and understanding of sound nutrition. The primary means of improving nutrition, even with the aged, must be education.

Decreased physical activity of the older person indicates that there must be a quantitative change in nutritional requirements, at least in calories. Changes in body size and in basal metabolism also point to decreased total food needs. Decreased food consumption is, as it should be, the rule. However, with decreased total food consumption, the pattern of the remaining diet may represent an unfortunate selection; therein lies one basis for malnutrition.

Dr. Keys is director of the Laboratory of Physiological Hygiene of the University of Minnesota, and professor in the University's School of Public Health.

Malnutrition Among Aged Persons

It is frequently said that malnutrition is much more common among aged persons than in the rest of the population, but there is little real evidence on the subject. Surveys of food consumption purporting to show a high incidence of dietary inadequacy in older persons use arbitrary standards of nutritional "requirements" which may be excessive for the whole population and which make no concession to the fact that the older person represents a smaller and considerably less active metabolic machine.

Nevertheless, it is possible that the incidence of malnutrition is relatively high among older people. A large proportion of elderly people have chronic disorders or diseases; some of these tend to promote malnutrition, particularly by restricting the choice of foods. Missing teeth, faulty dentures, slow digestion, and diminished taste acuity contribute to change the choice of foods. Dysentery or other diseases may cause inefficient intestinal absorption which, in turn, may reduce the actual nutrient supply to the tissues.

While the foregoing factors may have great importance in some individuals, it is probable that more purely psychological and sociological factors are influential in inducing malnutrition in older persons. A reduction in calorie needs is usually accompanied by a reduction in food interest, particularly for food variety, so that many older persons incline to progressive simplification and monotony in their self-selected diets.

When elderly persons prepare their own meals, easy availability and ease of preparation may dominate food selection, with resulting neglect of nutritional quality. This is often true in the older person who lives alone. In many communities the most extreme cases of malnutrition are seen in two classes of people—alcoholics and elderly recluses—both of whom tend to great oversimplification of the diet.

Economic factors are also important in malnutrition among older persons. At the present time, a large proportion of aged persons in the United States have totally inadequate economic resources; their meager savings, fixed incomes, and pensions are insufficient to adjust to rising

food costs except through drastic curtailment of food expenditures. This usually means less of the "protective foods"—meats, dairy products, fresh vegetables, and fruits—with replacement by cheaper items such as bread, potatoes, and sweets. A similar pattern is often seen in boarding houses and homes for the aged, where the necessity of operating on a limited budget leads to a qualitative nutritional minimum.

The kinds of malnutrition found in older persons are those found at all ages of adulthood. The older person tends to follow the dietary pattern of the community rather than any special pattern of old age. For example, if the community dietary pattern is conducive to pellagra, then pellagra will be found frequently in the older members of that community. There is, however, an important qualification. The older person tends to follow the dietary pattern of the years when his own life habits were being formed. This in itself may account for more malnutrition in older people than in the rest of the community who profit more from the advance of nutritional knowledge. Grandmother did not grow up eating oranges and hence is not in the habit of eating citrus fruit; grandfather was not reared to eat what he may term "rabbit food" and so is not interested in salads and green vegetables.

Calorie Needs

The basal metabolic rate declines steadily with age. At equal body size (surface area), the decline is of the order of 3 to 5 percent per decade beyond the age of 50 years. Moreover, in old age the body size diminishes, both in weight and in height, so that the estimated decline in that portion of the individual's calorie needs which pertains to basal metabolism is about 5 percent for every 10 years.

In young adults, physical activity accounts for at least half of the total calorie needs, and in some individuals two-thirds or more of the total energy expenditure is due to physical activities. This energy expenditure is reduced progressively beyond the twenties, but a more striking diminution in physical activity occurs when real old age sets in. The aged person rarely engages in manual labor, for the good reason that he is seldom capable of it, and his various infirmities

incline him to a sedentary life. Unnecessary activity is avoided, and movements are deliberate. There are exceptions, of course, but the general rule is a great reduction in calorie needs as compared to those of young or even middle-aged adults.

Records of food consumption under controlled conditions provide detailed confirmation to what is generally known from ordinary observation. Body weight in elderly people is often maintained with intakes of 1,500 calories or less in women and 2,000 calories or less in men. These low intakes are not a cause for concern so long as body weight and nitrogen balance are maintained. Unless the person is already unduly thin, some small progressive weight and nitrogen loss is to be expected, because the aged person certainly does not maintain—and cannot have—the muscle mass of 40 years earlier. If the body weight at age 70 is the same as that at age 40, it is almost certain that there has been a large gain of fat.

Obesity

Calorie undernutrition, of course, can and does occur in old people, but in the United States the opposite form of malnutrition—obesity—is far more common and troublesome. Insistence that elderly people should continue to eat as they did when younger is one of the more dangerous implications of the publication of tables of calorie “requirements” which make no allowance for changed conditions in the later years of life.

Obesity is a double handicap to older people. First, an undue burden of sheer weight must be moved by muscles—including the heart muscle—that are becoming progressively weaker. Second, obesity is a health hazard of great consequence, because the continuance of vigor and of life itself in the elderly is a contest against the progress of the so-called degenerative diseases, particularly diseases of the cardiovascular system and diabetes, and obesity very clearly seems to promote these. Cancer and the other neoplastic diseases are likewise special enemies of the aged, but a direct implication of obesity in them has not been proved. In animals, however, chronic undernutrition exerts a protective action against cancer.

Dietary Needs

Nutritional needs of older people, then, are not different in kind but only in amount; proteins, fats, carbohydrates, vitamins, minerals, and salts, all have their place in the diet.

Proteins

It is currently customary to insist on a relatively high protein intake for old people. Actually, there is no evidence that the old man's protein needs are higher than those of the young man; indeed, it is possible that the older person may actually “require” slightly less protein than he did earlier in life. This would follow, perhaps, from realization that in old age progressive muscular atrophy is yielding some endogenous nitrogen which might serve other purposes in the body; the amount is trifling, however, and seldom could exceed the equivalent of 5 pounds of lean meat in a year.

The recommendation of a generous protein intake is defensible on the grounds that one should combat a common tendency of old people to choose a very high carbohydrate diet—grandmother's “tea and toast” regimen—and that high-fat diets are specifically objectionable for the aged. General rules may be inapplicable to some individuals, but it appears that a daily allowance of 1 gm. of protein per kilogram of body weight is at least as adequate for the old as it is for the young. Furthermore, it is wise to insist that several different food sources make substantial contributions to the total protein intake. The rule of variety in the diet is useful here, since it helps to assure adequacy of other nutrients.

Fats

Strictly nutritional evidence points to a small need for dietary fats as such. In human diets, fats are important as a source of calories, as a vehicle or aid for absorption of fat-soluble vitamins, and for their effects on flavor and consistency of foods. Commonly, American diets seem to provide 30 to 40 percent of their calories in the form of extractable fats (and oils), but this percentage could be lowered substantially without any necessary nutritional harm. Since fats are reported to cause “indi-

gestion" in the elderly, and there are other reasons for recommending a low-fat diet in this age group, the limitation of fat intake to 15 to 25 percent of total calories seems reasonable.

Carbohydrates

It would seem enough to advise limitation on the most highly refined carbohydrate foods—sugar and white flour—in favor of more natural mixtures of nutrients. These impose less violent loads on the sugar-regulating machinery of the body and are less apt to produce digestive disturbances in persons who suffer from sluggish digestive processes.

Vitamins

The vitamin needs of older persons are, if anything, less well known than those for younger persons. There is a very large margin of uncertainty as to what amounts of the several vitamins are definitely required and what additional amounts are useful in any way. Since older people generally tend to show greater variability at the same age than do younger people, it is reasonable to suspect that they have large individual variability of vitamin needs.

In recent years there have been some attempts to show that older people have, on the average, relatively high vitamin requirements. Although these studies have yielded much valuable information, they have signally failed to establish the general thesis of elevated vitamin needs in the aged. On the other hand, there is no evidence of diminished needs with advancing age except, perhaps, for those vitamins which are required in proportion to the total metabolism or to the total carbohydrate metabolism. Thiamine seems to belong in this class, and perhaps riboflavin and niacin may be included because they participate in carbohydrate metabolism. But the safest course is to provide all of the vitamins in amounts that would be considered appropriate for younger people.

Minerals

Many of the foregoing remarks about vitamins could be applied with small change to the mineral needs of older people.

Attention is usually concentrated on iron and calcium for the aged. A mild anemia, which

may respond to iron therapy, is common in older people. In these cases it is probable that low iron intake is responsible rather than an elevated need for minerals in elderly persons. A diet with a good provision of lean meat, liver, eggs, whole wheat, leafy green vegetables, and dried fruits—raisins, peaches, apricots—will supply ample iron as well as the trace elements (copper, cobalt) which are necessary for blood building.

The calcium problem is not quite so simple. Progressive demineralization of the bones is a characteristic of old age, or at least of extreme old age. Whether this can be prevented by extra calcium in the diet is highly questionable. In some cases of rather similar but more definite bone disorders, such as hunger osteopathy, extra calcium seems to be far less beneficial than prolonged treatment with vitamin D. But there is no evidence that vitamin D is useful in retarding or preventing demineralization in the aged. Conclusions based on the measurement of calcium excretion in older people are likewise questionable in the absence of data to show that extra calcium influences in any way the long-range calcium balance in old age. There is much evidence to show that experiments of a few days or weeks may be totally misleading about calcium requirements.

From such negative arguments it might be suggested that the conservative answer would be to insist on superabundant calcium intakes in case they might be useful. However, calcium deposition in tissues other than bones is definitely a real problem in old age. The possibility of promoting such deposits is not to be accepted lightly. Fortunately, however, the body's capacity to regulate its own calcium balance is such that the provision of a good ordinary intake—say 1 gm. daily—seems unlikely to promote either calcium depletion or deposition.

Salts

The dietary supply of salt or, more specifically, of sodium, raises special questions because of the high incidence of hypertension and cardiac failure in the aged. In some hypertensive patients, rigid restriction of sodium intake is beneficial. High salt intakes are deleterious to the patient in or on the verge of cardiac failure. What then, should be the ad-

vice to the elderly person who does not have hypertension or exhibit indications of approaching cardiac failure?

Apparently moderate restriction of salt is of no benefit in the treatment or prevention of hypertension. Nor is there any evidence that moderate salt restriction will delay or prevent the cardiac failure which may develop on an ordinary salt intake. The very low sodium intakes prescribed in the treatment of hypertensive patients cannot be advocated except in real medical emergency; they impose an almost intolerable mode of life on the individual and pose a very serious problem in maintaining good nutrition.

The conclusion is that the elderly person would be well advised to avoid high sodium or high salt intakes but not to attempt serious restriction of either one. Unless the weather is excessively hot, a daily intake of 3 to 5 gm. of sodium chloride would be ample and would satisfy all ordinary tastes after a few days or weeks. In very hot weather and under other conditions which produce excessive perspiration, the salt intake should be increased to correspond with the fluid intake. Salt tablets are rarely desirable.

The Atherosclerosis Problem

Atherosclerosis is unquestionably one of the most, or perhaps the most, serious health problem of old age. While this is a slowly developing condition, probably beginning far earlier than when old age is actually at hand, any possible influence of nutrition in old age upon this disease must receive close attention.

The incidence of atherosclerosis is much increased in obese persons, although it may occur in persons who have always been thin. Also, the development of atherosclerosis tends to be related to the level of cholesterol in the blood serum, although, again, it may occur in persons who have relatively low cholesterol values. The diet should be such as to prevent obesity—or to correct it if present—and, if possible, to keep the blood cholesterol level at a relatively low level.

Arguments that the amount of cholesterol in the diet may be reflected in the blood level are not supported by more critical studies of man.

Only at extremely high intakes—far above the cholesterol content of all ordinary diets—is there reason to believe that the dietary cholesterol has any influence on the blood level. But evidence is steadily accumulating that the fat intake in the diet has an important effect. The blood-serum cholesterol level rises on high-fat diets and falls on low-fat diets. Moreover, there seems to be no discernible difference between animal and vegetable fats in this respect.

Excretion and Dietary Bulk

The incessant barrage of advertising of laxatives, cathartics, and bulk-formers is probably more responsible for the wide use of such materials by older people than any natural need. Many older people are, or think they are, troubled with constipation. A common tendency in old age to use diets which have small residues, coupled with the fact of smaller total food intakes, naturally leads to progressively smaller and less frequent stools. It is by no means clear that this is necessarily undesirable physiologically, but it often causes concern and resort to laxatives which may, in turn, disturb the orderly rhythm of excretion.

A more reasonable approach to the control of bowel regularity is to include in the diet foods which provide an appreciable residue for excretion—root and leaf vegetables, fruits, and whole grain or incompletely extracted cereals. Whole corn kernels are not recommended because they may be irritating. The specific addition of bran or ground cellulose is rarely desirable, in view of their irritating effect on the intestines. The constant use of mineral oil is objectionable for several reasons, including possible interference with the absorption of fat-soluble vitamins. Finally, a good deal of constipation would be “cured” if patients could be convinced that failure to have a bowel movement every day is not necessarily cause for alarm.

Longevity

It might be presumed that a “good” diet should be, among other things, “good” for the achievement of maximum longevity. But this raises the question whether the best diet for

extending the years of life is also best in all other regards—maintenance of vigor, resistance to infection, wound healing, sheer enjoyment of life, and so on. In those animal species which have been studied, chronic underfeeding seems to be the surest way of achieving long life and, within limits, the life span is proportional to the degree of underfeeding, particularly when underfeeding is applied during the period of growth. The attainment in man of maximum longevity by such means is hardly desirable or practicable. Moreover, there is no evidence that underfeeding in old age would have any such effect.

Nutritional Education

In old age, as at other ages, education is the most reliable way of assuring good nutrition. For older people who care for themselves, nutritional education cannot be stressed too much. Their nutritional knowledge lags far behind that of their younger contemporaries. Emphasis should be placed on practical matters, but the reasons behind the nutritional advice should be explained. The following may serve as reminders of important points to be covered.

1. A good diet is just as important in old age as in youth.
2. Overeating is more dangerous for the old than for the young.
3. Older people should be sparing in the use

of all fats and oils and should avoid cooking in fat.

4. The simplest way to assure adequacy of proteins, vitamins, and minerals is to use a varied diet made up of natural foods with a minimum of processing.

5. Cooking in large quantities of water is certain to result in losses of vitamins and minerals.

6. Liberal use of leafy and root vegetables, fruits, and coarse cereals will help control constipation. Failure to have a regular bowel movement every day is not constipation.

7. Bread enriched with milk solids and vitamins is desirable.

8. There should be an abundant fluid intake, and this may include moderate amounts of coffee, tea, and alcoholic beverages. The latter are best taken with, or immediately before, meals.

9. Meat, fish, or eggs every day should be the rule.

10. Special food concentrates and nostrums are seldom necessary. Peculiar and fancy diets should be avoided.

11. Moderate limitation in the use of table or cooking salt is wise.

12. A physician should be consulted if there are pronounced changes in weight or energy, or peculiarities of the skin, mucous membranes, or tongue. A periodic physical examination is advisable.

13. Food should be a source of pleasure and of health; the proper use of nutritional knowledge will help to assure that this is so.

Health Program in Ethiopian Road Building Project

The Public Health Service recently assigned a medical officer and a sanitary engineer to safeguard the health of 50 American engineers, their families, and 1,000 native laborers building a 700-mile highway in Addis Ababa.

At the request of the Government of Ethiopia, the highway is being constructed by the Bureau of Public Roads, United States Department of Commerce. World Bank funds are being used for the project.

The medical officer will operate a mobile medical clinic. He will be responsible for contacts with the National Ministry of Health and local medical personnel and hospitals, concerning his work and the care of patients.

The sanitary engineer will be in charge of planning and administering all sanitation measures for disease control, including water supply, food service, malaria control, and general sanitation problems.

Temperature Effect on the Colloidal Mastic Test

By GEORGE R. CANNEFAX, B.S., and C. W. TOW, B.S.

The colloidal mastic test is widely used as one of the laboratory diagnostic aids in the management of central nervous system syphilis. The procedure is highly sensitive to slight changes in laboratory technique, and it has been thought that the temperature at which the test is performed may influence the results.

The sensitivity of the colloidal mastic test is affected by several factors, such as electrolyte concentration, type of electrolyte, and size of the colloidal particles. When these factors are adequately controlled, reasonably reproducible results are obtained. However, there are times when the sensitivity of the test varies from the usual or expected level, indicating that there are other factors concerned. Since temperature changes affect activities of colloids, and no reference could be found in the literature, this study was initiated to determine the effect of various temperatures on the sensitivity of the colloidal mastic test.

Materials and Methods

Three reagents were prepared in sufficient quantities for 270 tests: a 10-percent solution of gum mastic in absolute ethyl alcohol; a 1.25-percent sodium chloride solution; and a 5-percent solution of potassium carbonate in freshly distilled water. Cutting's (1) modification of the colloidal mastic test was used, and the sensitivity adjusted with optimally alkalinized salt solution. Dehydrated stable control serum (2)

was used as the constant source of specimen material in the test performance.

Sufficient dehydrated stable control serum was reconstituted to the proper volume for use as a control for colloidal mastic tests. The control was apportioned in stoppered test tubes in amounts sufficient for one day's testing and frozen until needed. For each day's tests, one tube was thawed and 100 ml. of a 1:4 dilution was made with optimally alkalinized 1.25-percent salt solution. Ten serial dilutions, using alkalinized 1.25-percent salt solution as the diluent, were made in 50-ml. accounts, as follows: 1:8, 1:16, up to 1:2,048. One milliliter of each dilution was placed in each of 27 tubes, making a series of 27 tests of 10 tubes each, with the control serially diluted from 1:4 in the first tube to 1:2,048 in the tenth tube. Nine sets of dilutions were placed in the 37° C. incubator, 9 sets left at room temperature, and 9 sets placed in the refrigerator. To permit the tubes and dilutions to reach the desired temperature, each set was allowed to stand at room, refrigerator, and incubator temperatures for 1 hour before adding the colloidal mastic. Temperature ranges during the testing period were: room, 5° to 26° C. (minimum, 5° to 15° C.; maximum, 21° to 26° C.); refrigerator, 4° to 6° C.; incubator, 37° ± 1° C.

Three mixes of precipitated mastic were made each day. Each mix was precipitated by adding 2 ml. of 10-percent mastic solution to 18 ml. of 95-percent ethyl alcohol and rapidly pouring the 1-percent mastic solution into 80 ml. of freshly distilled water, with moderate agitation. One mix and one lot of distilled water were allowed to stand at each of three temperatures (incubator, room, and refrigerator) for 5 hours prior to mixing.

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Three groups of dilutions of nine sets each were maintained at incubator, room, and refrigerator temperatures; the mastic solutions, which had been precipitated at the same three temperatures, were added to the dilutions; and the tests allowed to remain overnight at these temperatures. Thus, the effect of temperature on the sensitivity and reproducibility of the colloidal mastic test could be studied in relation to temperature at which dilutions were maintained prior to addition of colloidal mastic, temperature of the alcoholic mastic solution and water at the time of precipitation of the mastic, and temperature at which the tests were maintained overnight.

Results

Test results are shown in the accompanying table. The figure given for each dilution represents the arithmetic average obtained from the results of 10 tests performed in an identical manner on 10 consecutive workdays. The daily results did not vary more than $2 \pm$ from that shown as average for any given dilution.

Discussion

The table indicates that the overnight temperature has the greatest influence on the sensitivity of the test, and that the most consistent, and most sensitive, results were obtained when the tests were allowed to remain overnight in the 37° C. incubator, regardless of the temperature at which the mastic was precipitated or the temperature of the dilutions when the mastic was added. Test results were most uniform when the tubes remained overnight in the incubator. Some decrease in sensitivity was noted when the tubes stood overnight at room temperature, and sensitivity decreased further at refrigerator temperature.

The temperature extremes of 37° and 4° C. were selected for evaluation, since it is not uncommon for seasonal changes to produce fluctuations of this magnitude. These incubator and refrigerator temperatures are normally maintained in most laboratories, and therefore the temperature of choice could be standardized without complicating routine conditions.

Temperature combinations and results

Dilution temperature ¹	Colloidal mastic temperature ²	Overnight temperature	Results ³
Incubator (37° C. \pm 1° C.).	Incubator	Incubator Room Refrigerator	5554321000 5553210000 5532110000
	Room	Incubator Room Refrigerator	5554321000 5543210000 5532100000
	Refrigerator	Incubator Room Refrigerator	5554321000 5543210000 5532100000
Room (5° to 26° C.).	Incubator	Incubator Room Refrigerator	5554321000 5543210000 5532100000
	Room	Incubator Room Refrigerator	5554321000 5542100000 5531000000
	Refrigerator	Incubator Room Refrigerator	5554321000 5543210000 5431000000
Refrigerator (4° to 6° C.).	Incubator	Incubator Room Refrigerator	5554321000 5542100000 5521000000
	Room	Incubator Room Refrigerator	5554321000 5542100000 5421000000
	Refrigerator	Incubator Room Refrigerator	5554321000 5543210000 5431000000

¹ Prior to addition of precipitated mastic.

² Alcoholic mastic solution and water at time of precipitation.

³ Average of 10 tests performed on each of 10 consecutive working days.

Conclusions

Use of a stable control serum in proper dilution as a constant source of specimen material indicates that a more uniform level of sensitivity and a higher degree of reproducibility will result with the colloidal mastic test if the tests are stored overnight in the 37° C. incubator.

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Water Works in Civil Defense

By G. E. McCALLUM, C.E., MARK D. HOLLIS, C.E.,
and HARVEY F. LUDWIG, M.S.

The basic responsibility for civil defense correctly belongs to local people and local agencies. A philosophy of "self-help" is being forced upon us by the unparalleled seriousness of the world political situation. We realize that in time of disaster remote and higher-level agencies will be able only to help us help ourselves. Our interest here is to evaluate some of the benefits that have resulted from joint local, State, and Federal efforts to develop a water works civil defense program within the framework of the self-help philosophy.

The National Role

The Federal Civil Defense Act of 1950 is the first authorization ever made by the Congress for civil defense in the United States. Prior Federal civil defense activities, including the Office of Civilian Defense of World War II, were implemented only by Executive orders. The act specifically provides that responsibility for civil defense shall be vested primarily in the States and their political subdivisions; the Federal Government shall furnish coordination, guidance, and such other assistance as it is best qualified to furnish, including organization of mobile support and other interstate activi-

ties, training of personnel, conduct of research, and procurement and stockpiling of necessary materials and supplies.

In the field of water supply, Federal activities are just beginning. The FCDA (Federal Civil Defense Administration), through its engineering and public health divisions, is in the process of publishing a fairly comprehensive technical manual, "Emergency Repair and Operation of Water Works in Disasters." Substantially a revision of the OCD World War II publication, "Water Works Engineering in Disaster," the new manual is organized into two parts: Part I discusses over-all water works management and the problems of maintaining quantity of supply; part II is concerned with the safety of the supply and considers the possibilities of contamination by special weapons (radiological, biological, and chemical), as well as by sewage. The manual is designed to serve the needs of both large and small water works for peacetime as well as wartime disasters.

Another important activity of the Federal Government is the performing of research to develop information needed to improve water works "defense" against contamination. While most of this work now has a security classification, it is expected that water works officials will be furnished with really pertinent information as it is developed, either by declassification or other mechanism.

Work is also beginning, under the leadership of the Public Health Service, on a national program for internal security for the water works industry, and the FCDA is planning a program for some stockpiling of pipe, chlorinators, and other emergency repair and purification equipment.

Mr. McCallum is chief of health emergency planning and Mr. Hollis, an Assistant Surgeon General, is chief sanitary engineer, Public Health Service. Mr. Ludwig is a sanitary engineer consultant of the Federal Civil Defense Administration. This paper was presented at the Arkansas Water and Sewage Conference, April 9, 1952.

Regional Activities

Probably the most important work of the Federal Government awaits the establishment and filling of sanitary engineer positions in the nine FCDA regional offices. The FCDA budget has thus far permitted the employment of only a small sanitary engineer staff at Washington headquarters. This small group has been engaged in such civil defense sanitary engineering activities as water supply, sewerage, refuse disposal, milk and food sanitation, insect and rodent vector control, engineering aspects of emergency welfare services, mortuary services, radiological monitoring and decontamination, and engineering aspects of chemical and biological warfare defense. The appointment of regional sanitary engineers should greatly improve the development of effective collaboration between Federal, State, and local civil defense agencies, especially with respect to mutual aid and mobile support.

The importance of mutual aid and mobile support cannot be overemphasized. They are the basis of the planned pattern for American civil defense. The effectiveness of actual disaster relief operations will be largely determined by the efficiency with which skilled personnel and equipment can be mobilized and deployed on a regional basis. The FCDA regional office engineers, assisted by Public Health Service regional engineers and by key State personnel, such as State sanitary engineers, will be primarily responsible for planning such interstate programs and for exercising leadership in prosecuting them.

Local Activities

The basic civil defense job remains, however, for the individual water works to perform. Only it has the resources needed to achieve improvements in the physical plant, for assembly of necessary maps, tools, equipment, and other facilities needed for making emergency repairs, for organization and training of regular and reserve personnel, for integrating its program with other local civil defense programs, and for conducting test exercises with other communities in the region to check and improve the adequacy of the defense measures.

Of great importance is the interest shown by the smaller communities, which might well consider themselves relatively safe from attack and hence not greatly concerned, but which have the reservoirs of personnel and equipment necessary to the success of the mutual aid programs.

Importance of Water Supplies

Although classified as a utility service, a water works differs in important respects from such utilities as communications and power. Water works have two vital roles in disaster relief: Sufficient water must be made available for fire fighting; and, at the same time, a safe water supply must be maintained. Safe water has become so commonplace in our community living that even some of our health officials find themselves guilty of assuming that such safety, once achieved, will always be present. On the contrary, the development of atomic and other special weapons has made it more probable than ever that only extraordinary and carefully planned efforts can maintain the safety of supply in time of disaster.

Another important difference in the water works as a utility is the individual nature of water works systems. They are not so physically connected through a network that a load dispatcher can pool their resources and direct them to a point of need. By contrast, power utilities have virtually region-wide systems of mutual aid. They can very quickly, through prearranged plans, mobilize and apply their resources to a stricken area. In the water works field such collaboration must be developed, as already emphasized, through the mechanisms of mutual aid and mobile support.

Significance of Special Weapons

The continuing development of the ABCR (atomic, biological, chemical, and radiological) weapons imposes a continuing need for evaluating them as possible contaminants of water supplies. Such evaluations are difficult since even possibilities that seem remote must be considered. Radiological contamination of water to any serious degree, for example, is considered by many to be very unlikely; yet, because it is a possibility, much work has had to be done in

developing safe emergency levels of tolerance, quick and accurate methods of detection, and practical means for removing radioactive contaminants.

Of more real concern are the possibilities that biological and chemical agents might be employed to contaminate water supplies. The prospect that contamination of water with these agents might be attempted or accomplished as an act of war is difficult to evaluate, in the sense that there has been no actual use of these agents for this purpose, but in any case the prospect is extremely unpleasant. Continuing research studies must be undertaken to develop means for detecting and otherwise coping with these agents.

Although both chemical and biological agents might be used for contaminating water, the logistic problem may be much simpler with biological agents, such as bacteria. These, of course, are living organisms that can multiply in the body of a victim so that it is not necessary to introduce the total number of bacteria required to kill the host. A single *Brucella* germ may be sufficient to start brucellosis infection that may prove fatal. Thus far the most promising development in the realm of defense against biological contamination of water is the widely publicized membrane filter. In its present stage the membrane filter can scarcely be considered the answer to the problem of rapidly detecting biological warfare agents. It does, however, simplify and minimize the work of routine bacteriological testing, which in itself is of civil defense value, and further research may expand its range of usefulness.

Accrued Benefits

One of the primary results to date of the civil defense program in the local community is a new evaluation of the relative values of the various community services. The water works profession is faring excellently in this new thinking. Water works engineers have always been aware of the importance of their commodity to public living, but an increasing awareness of the enormity of the problem of civil defense is causing others to realize that this service is vitally important—that the lives and safety of

thousands of people may rest upon the ability of the water works to maintain an adequate and safe supply.

Such recognition is also, of course, helping to solve peacetime problems in the water works field. It is proving very valuable, for example, in assisting water works officials in obtaining funds and materials for much-needed improvements, especially since it can be shown that most of these improvements have direct civil defense significance. It has a stimulating effect on water works officials themselves, in interesting them to improve their operations to levels of higher efficiency.

Civil defense efforts in the water works field are also doing much to consolidate and improve the traditional relationships between water works officials and State and local health departments. These two groups have basic interests and responsibilities with respect to safety of water supplies, and in the past have satisfactorily managed to coordinate them, each working in its own manner. Now, however, both groups recognize that a more efficient and more intimate relationship must be achieved if their responsibilities are to be properly discharged during the critical period following attack.

Moreover, the concepts of mutual aid and mobile support have actually done much to reverse the attitude of local, State, and Federal officials toward each other. The local officials recognize how vitally important State assistance can be, and the State officials are thinking of Federal assistance in terms of an invited blessing instead of bureaucratic control. The Federal agencies, likewise, have become keenly aware, perhaps for the first time, of their own limitations. The prospect of having to mobilize for a total effort has forced their recognition of the local citizen as the most important cog in the machine.

In summary, we must remember that civil defense activities in the water works field, as in most others, must be accomplished essentially by a shifting of emphasis with respect to our "usual" activities. The maintenance of usual water works services during wartime is the responsibility of existing water works and public health agencies together with individual pro-

fessional experts. The adaptation of water works to serve the extraordinary needs of disasters is the responsibility of civil defense. In view of the technical and professional requirements, the civil defense measures and services must continue to be the responsibility of the existing water works and public health agencies and individuals, but these agencies and individuals will perform their wartime disaster re-

lief functions under civil defense rules and regulations.

Civil defense in water works may, therefore, be said to be the job of everybody who is normally concerned with water works. This must not be interpreted as meaning that it is nobody's job. Each of us must do his part. Each of us must make his responsibility a part of his everyday business and affairs.

Relationship Between Inoculations and Poliomyelitis

The possible relationship of various types of inoculations and poliomyelitis has been the topic of much discussion and a number of papers since the 1950 reports from England. Last fall the State and Territorial Health Officers Association asked the Public Health Service of the Federal Security Agency to sponsor a study on the question and issue a clarifying statement. Subsequently, the Public Health Service, on March 14, 1952, sponsored a meeting of 42 poliomyelitis investigators, epidemiologists, pediatricians, allergists, and health officers. The National Foundation for Infantile Paralysis helped plan and participated in the conference.

The conference voted unanimously in favor of the conclusions contained in the following statement which has been accepted by the Public Health Service and is being transmitted to official health agencies, to the medical profession and to the general public.

There is no definite evidence that an increase in the number of cases of poliomyelitis has occurred as a result of injections of vaccines, drugs, and other medicinal agents. There is evidence that injections for the prevention of diphtheria, whooping cough, and possibly tetanus, when given during an epidemic of poliomyelitis, may, on rare occasions, localize the paralysis in the inocu-

lated arm or leg. There is no satisfactory evidence that other types of injections have any effect on the localization, frequency, or severity of poliomyelitic paralysis. In the small number of persons with localization of paralysis in the inoculated limb, the injections, for the most part, were given about 7 to 21 days prior to onset, which corresponds to the usual incubation period of poliomyelitis. This has raised the question as to whether or not inoculated persons have a greater chance of contracting poliomyelitis during an epidemic.

There is as yet no final answer to this question, but it is a fact that, even if there should be an increased chance, it is extremely small. Many thousands of poliomyelitis cases occur every year among children who have not had any injections during the preceding few months, and thousands of children have received injections for whooping cough, diphtheria, and tetanus during poliomyelitis epidemics and have not developed the disease.

Diphtheria, tetanus, and whooping cough are serious diseases which can be prevented by immunization. Unchecked, these diseases present a far greater hazard than poliomyelitis. The benefits derived from immunization against these diseases far outweigh the questionably small increased chance of contracting

poliomyelitis. However, even this questionable risk can be avoided by carrying out these immunizations when poliomyelitis is not epidemic in the community. There appears to be no good reason for withholding these immunizations during the summer months in communities that are not having an epidemic of poliomyelitis.

Furthermore, poliomyelitis is at all times so rare in infants under 6 months of age, and the danger from other infectious diseases, particularly whooping cough, is so great, that it is advisable to continue the immunization procedures for this age group even during a poliomyelitis epidemic. In adults also, poliomyelitis is relatively so infrequent, that when there is a need for immunizing or therapeutic injections, such injections should not be withheld.

Certainly no parent should object and no physician should hesitate to administer a needed antibiotic, drug, or other injection for treatment of disease at any time. When there is immediate danger from diphtheria, whooping cough, or tetanus, the preventive inoculations should be given to all threatened age groups even during a poliomyelitis epidemic. In the final analysis the decision as to when an immunizing or therapeutic injection shall be given to an individual patient must rest with the physician.

Ideas

Have You an Idea?

Something new? Different? Better? An easier way to get a job done? A simpler approach? More efficient? Cheaper? Faster?

As a health officer, hospital administrator, nurse, sanitarian, health educator—whatever your position—the day-to-day problems you face more than likely have counterparts in many other places. How you tackle your tasks may be of very real help to others in similar situations. And notes on how they handle their problems may help you.

This "Ideas" section is a place to exchange experiences and approaches. You, as well as your colleagues, will benefit when you send in your ideas.

—THE EDITORS

Pastoral Counseling

BIRMINGHAM, ALA. The idea of an interchurch center and pastoral counseling has grown out of a series of meetings with ministers sponsored by the Ministerial Association and financed by the division of mental hygiene of the State Department of Health. Of 400 ministers in Birmingham, 150 attended to discuss counseling problems with the aid of an expert from Duke University. An institute on "interprofessional relations" is being planned for the summer.

A tentative budget of \$10,000 per year has been agreed upon for the pastoral counseling center. The division of mental hygiene has indicated that it will supply approximately one-third of this amount in order to help get the project under way. The remainder of the funds

is being raised by individual churches, and the committee of the Ministerial Association hopes to convince the Community Fund of the city to invest money in the project. The committee is hoping to get this center opened during the fall of 1952.

Nutrition Flip Charts

ALBANY, N. Y. Nutrition in pregnancy is the theme of a series of flip charts recently completed by the New York State Department of Health. The flip charts are designed as an

aid to nutritionists and public health nurses in teaching classes of mothers.

The charts consist of 24 pages illustrated in color and enclosed in a carrying case, which can also be used as an easel for display purposes. Nutritionists give personal instruction to the nurses in the use of the flip charts, explaining that the flip chart is an aid to the speaker and to the audience. It provides an outline of the topic, and makes omission of important points unlikely. It also emphasizes and clarifies the speaker's points by providing visual material for the audience.

Although a film strip serves a similar purpose, nutritionists, nurses, and educators have chosen flip charts over film strips for several reasons. The charts are easy to use, requiring no special equipment and no operator. Then, too, there is no cleavage of audience and speaker created by darkening the room for film strips.

Cardiac Work Ability

WASHINGTON, D. C. A Cardiac Work Evaluation Unit is now functioning here as a means of gauging the work and living capacities of heart patients.

Each patient and his "work tolerance" are considered by a team consisting of the referring physician, a cardiologist, a clinical social worker, a vocational counselor, a representative of Goodwill Industries, a United States Employment Service representative, and the project coordinator.

For the work evaluation service, each patient must be referred to the unit by his or her own physician (private or clinic physician), and must be either unemployed or threatened with loss of employment because of a heart condition.

No medical treatments are provided in the service, and, though its goal will be to return cardiac patients to gainful employment, it is not an employment agency.

The program is sponsored by the Washington Heart Association as a community service. No charge is made to patients.



A STUDY OF 1500 EXPECTANT MOTHERS IN NEW YORK STATE SHOWED:

11% NO milk.
11% NO meat.
56% NO eggs.
39% NO citrus fruits.

Trends in Illness and Mortality

By Selwyn D. Collins, Ph. D.

Illness and mortality data for the United States and several foreign countries have been collected and summarized to show long-time trends. An analysis of these trends indicates particularly the effect of wars and their aftermath on the public health.

Sources of Data

Much information is available on trends of mortality among persons of specific ages and by detailed causes, but very little is available on trends of illness over any long period of time. It is true that many of the acute infectious diseases, such as diphtheria, scarlet fever, poliomyelitis, and smallpox, have been reportable to health departments for many years, but the incompleteness of the reports is generally recognized by health workers. Even more incomplete are the reports for the diseases for which there is nothing in the way of treatment or prophylaxis to be gained by reporting them.

Some information on trends of illness may be obtained from the records of organizations that include groups of individuals for whom medical care is provided. Institutions of various kinds and private schools come under this category, but the largest such organization is the United States Armed Forces. Since

members of the armed forces receive complete medical care, a complete record of illness is usually made.

Other sources of continuous data on illness are the records of the various disability insurance associations in the United States and of compulsory sickness insurance in many countries of Europe. In most instances a doctor's diagnosis is available for each illness for which benefits are paid. Data from these sources, however, may be biased, since the regulations as to the types of illness covered and the minimum and maximum days of benefit allowable are changed periodically;

this is particularly true of compulsory insurance administered by governments.

Sickness surveys of various kinds also provide data useful in determining trends of illness. In 1880 and again in 1890, a question on illness was included in the United States census schedule. Questions about persons in institutions of various kinds, and persons with various types of physical handicaps, mental defects, and diseases have been recorded and tabulated in considerable detail in some State censuses since 1890. In Ireland the decennial censuses from 1851 to 1891 all included questions on illness, as did the censuses of 1881 and 1891 in Australia. In addition there were special surveys in a few cities in the 1890's, and fairly numerous sickness surveys have been conducted since 1915 (2).

There are several difficulties, however, in obtaining trends from special surveys: (1) Successive illness surveys even when made by a single organization are seldom done in the

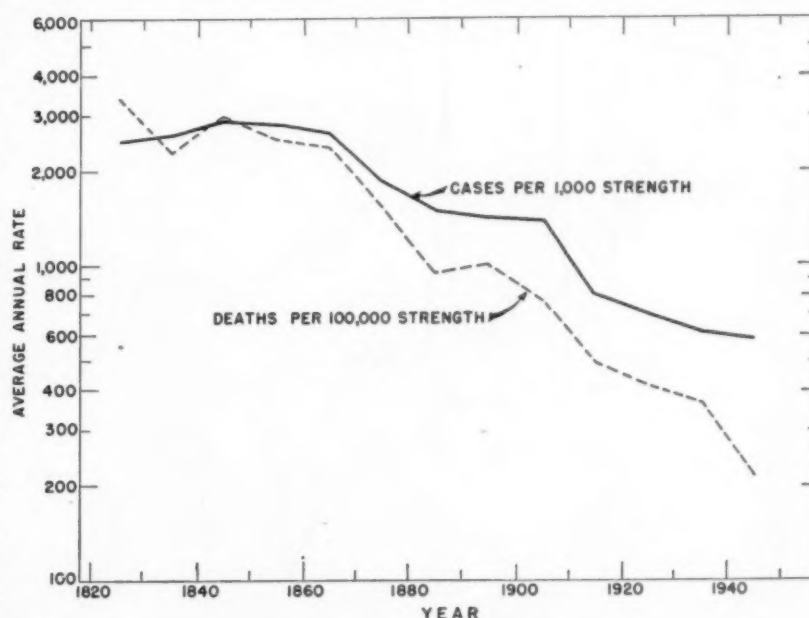


Figure 1. Trend of illness and mortality from all causes except battle casualties, U. S. Army, 1820-1949.

Average rates exclude 1833, 1834, and 1936 as not available, and 1847-48, 1862-66, 1918-19, and 1942-45 as war years or unreliable. Data in this and following charts for 1820-1940 are for enlisted men; 1941-49 data include officers.

Dr. Collins is chief of the morbidity and health statistics branch, Division of Public Health Methods, Public Health Service. This paper is, in part, a revision and extension to more recent years of trend data originally published by Dr. Collins in The Annals of The American Academy of Political and Social Science, January 1945.

same manner and with the same questions; (2) even if the schedules and questions are uniform, the procuring of illness data by rather short interviews with the wife or head of the family is so difficult that careful training of the interviewer is an important factor in obtaining comparable data from different surveys; (3) since surveys are frequently made for special purposes, it is impracticable to use uniform schedules.

Armed Forces and Civilians

The longest series of data available on trends of both illness and death is for soldiers in the United States Army for the 130 years since 1820 (6). Figure 1 shows these data in average annual rates for 10-year

periods. The war years, which usually show a high mortality from disease, have been omitted in the computation of the average rates. For easier comparison, the death rates are plotted as deaths per 100,000 soldiers, and the cases, as admissions to sick report per 1,000 soldiers. (Logarithmic scale is used.)

It is seen in figure 1 that illness rates decreased greatly over the 130-year period, but deaths declined even more rapidly, especially in the peacetime years of the last decade. It should be pointed out that these cases and deaths are from disease and accident only and not from battle injuries, and that they are for troops stationed in the United States.

Moreover, the great majority of the soldiers are of the ages 20 to 30 years, which ages have low sickness and death rates.

Wartime Peaks

Figure 2 shows mortality and sickness data on a yearly basis for the armed forces, including data for the war years, but excluding data from both battle casualties and nonbattle accidents.

The mortality rates for disease only show striking changes; high peaks are seen for the Civil War, the Spanish-American War, and World War I. The predominant diseases causing the high case and death rates during the Civil War (1) and also the high 1898 peak of the

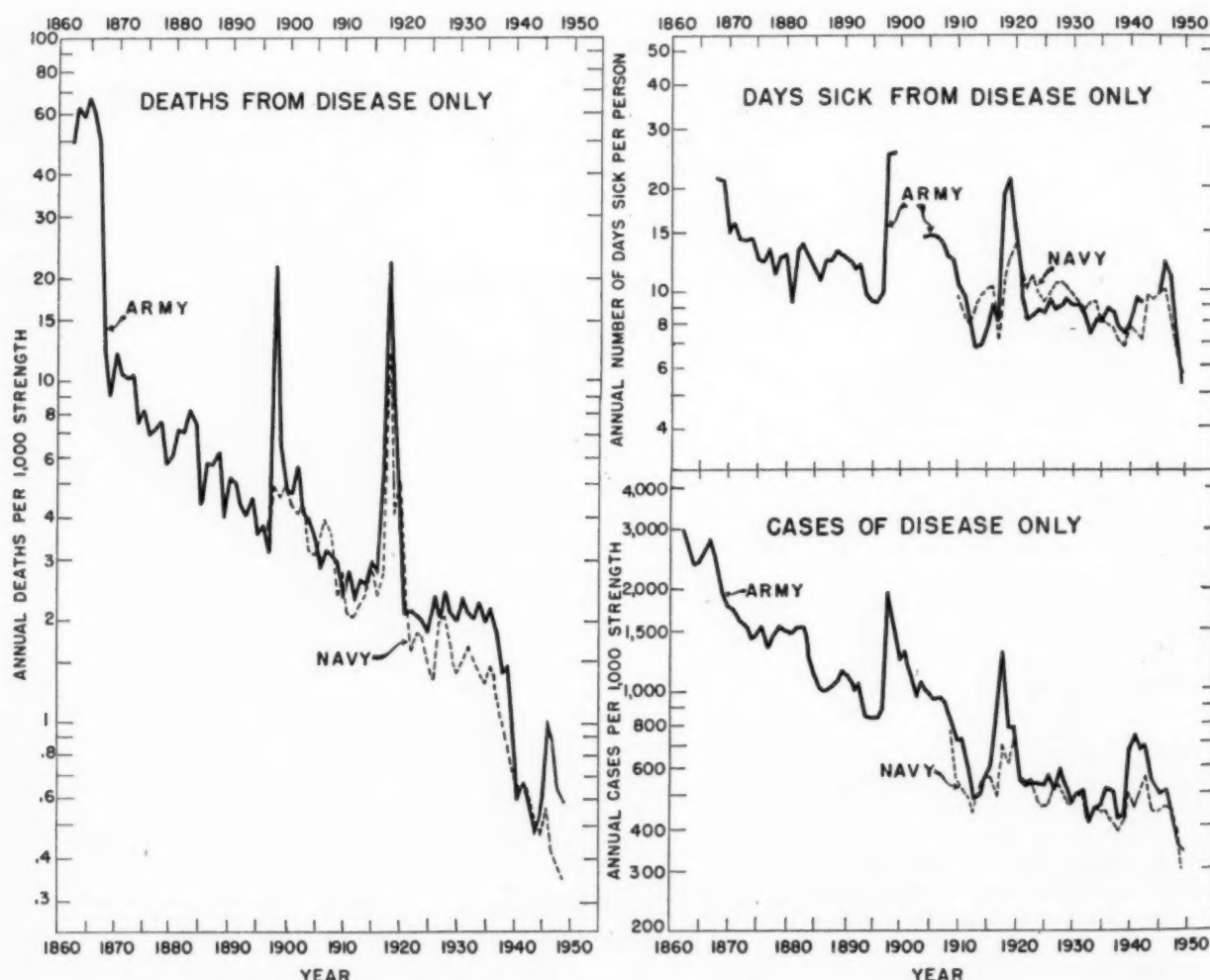


Figure 2. Trend of illness and mortality from disease only, U. S. Army, 1862-1949 (6); U. S. Navy and Marine Corps, 1897-1949 (7).

Spanish-American War were typhoid fever and the diarrheal diseases. The 1918 peak was almost entirely due to the great pandemic of influenza and pneumonia.

With the exception of two peaks, the death rates from disease in the Army declined rapidly after the Civil War until 1925. There was almost no decline, however, between 1925 and 1936; after that year there was a steep decline, which, with the exception of 1946 and 1947, continued until 1949, the last year for which data were available. The high rates of 1946 and 1947 may have been due in part to evacuees from overseas being brought to hospitals in the United States in 1945 and 1946.

The rates for the Navy and Marine Corps approximated those for the Army, although there was some decline in the period 1925 to 1936, but, as in the Army, a much steeper decline followed that year. Presumably a considerable part of this rapid decline in death rates in both services was due to the many improvements in therapeutics.

The lower right half of figure 2 shows cases of illness for armed forces personnel. There was a rather rapid decline in these rates from 1862 to 1896 when the build-up to the high peak of 1898 began; this decline continued at an even more rapid rate between the 1898 and 1918 peaks. It will be noted that the

sickness peaks of 1898 and 1918 were both relatively lower than the mortality peaks. From 1921 to 1939 the decline in sickness rates was less steep than in the earlier period. There was a considerable rise in the rate for the years 1940 to 1943, followed by a drop which was particularly rapid from 1946 to 1949.

The upper right half of figure 2 represents the annual days of sickness per person in the Army and Navy. The 1898 and 1918 peaks were definitely present although each extended into the next year with rates as high as or higher than for the first of the two high years. In this measure of illness, in terms of days lost from duty, there is considerably less downward trend than in the rates for either cases or deaths.

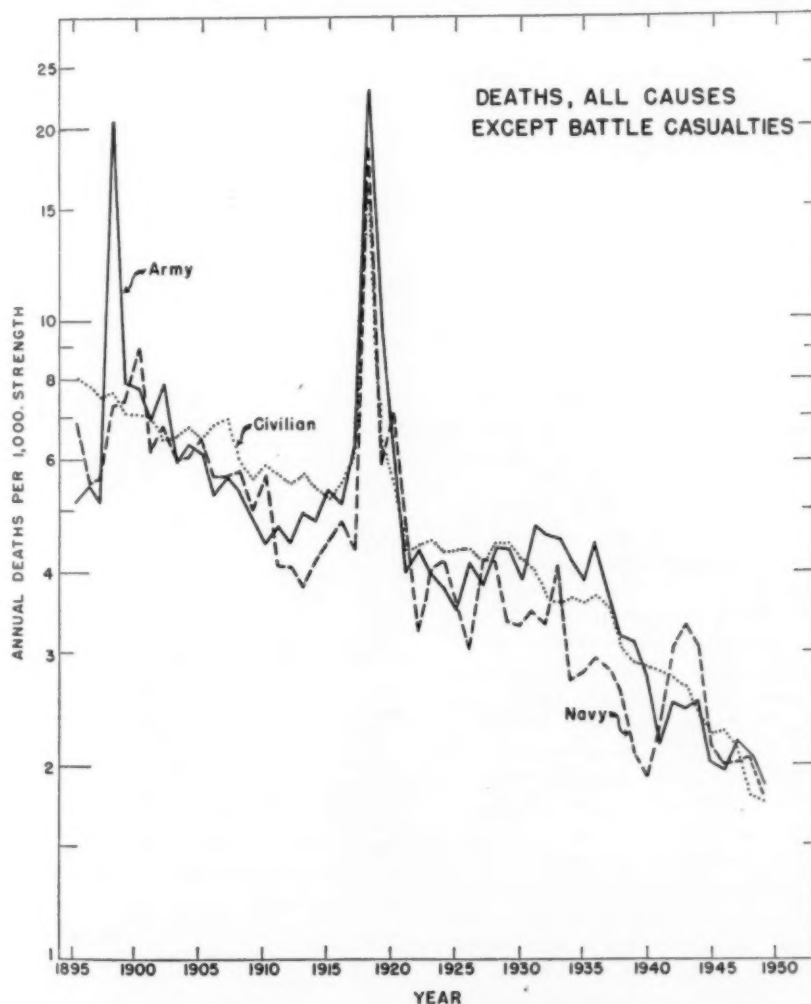


Figure 3. Trend of mortality from all causes except battle casualties, U. S. Army (6), U. S. Navy and Marine Corps (7), and civilian males of comparable ages, 1895-1949 (4, 5).

Comparison of Death Rates

Figure 3 affords a comparison of death rates for members of the armed forces with those for male civilians of approximately the same ages. To get a rate for a civilian group of comparable age with the military groups, simple averages of rates for males of the ages 15-24 and 25-34 were used. It is seen in the chart that the trend of mortality is roughly the same in the three groups, with the death rate among civilians in some periods tending to be somewhat higher than that among the armed forces personnel.

Illness Trends Among Industrial Employees

Data on the frequency of illness among industrial employees, as shown by absences from work, offer some measure of the trend of illness among civilians. The left half of figure 4 shows data for the approximately 3,000 employees of one large public utility establishment. From about 1920 to 1933 the rate of illness in this establishment tended toward a downward trend. There was little change in the rate from that date until 1940, when the rate for both males and females rose rapidly to a peak in 1946. After 1946 a definite drop occurred, but another small rise took place in 1950.

Data for a group of roughly 200,000 industrial workers (right half

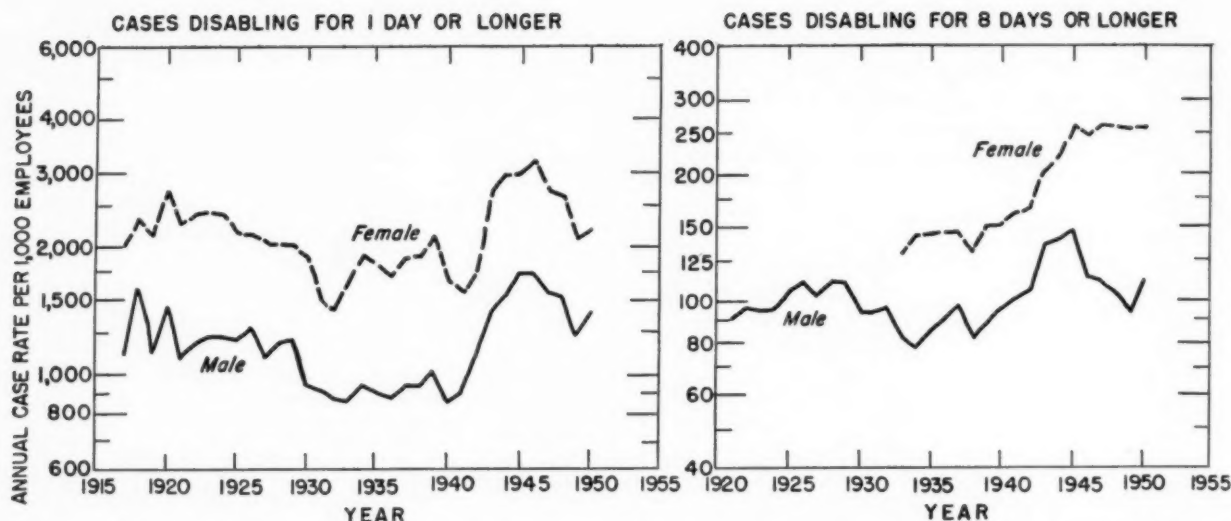


Figure 4. Trend of illness among selected groups of industrial employees, United States, 1920-50 (3).

of fig. 4) show the same downward trend from about 1928 to 1934. The downward trend was followed by a steep rise in the rate for males to a peak of 147 cases per 1,000 employees in 1945. In 1949 the rate dropped to 95 per 1,000, which was the approximate level of the rate for 1940; however, the 1950 rate showed another small rise. Among women employees there was a similar rise to a peak of 258 per 1,000 employees in 1945, at which approximate level the rate remained for the next 5 years.

The sharp rises in illness rates during the war years may have been a result of the inability to hire persons who were in the best physical condition, since the most healthy individuals were at that time in the armed forces. As the pressure for employees declined after the war, persons not in the best of health were probably the first to resign or to be dropped from employment. It is not clear why the rates of severe illness (8 days or longer) among women workers did not decline like those among men for both severe and mild cases and like those for mild cases among women.

Tuberculosis Mortality

Figure 5 shows the trend of tuberculosis death rates in many countries of the world from about 1910 to 1950, with data lacking from some

countries at both ends of this period. A special attempt was made to determine the trend before World War I and also after World War II.

It will be noted that in nearly all of the countries where the intensity of the war was greatest (two top sections of chart), the tuberculosis mortality rates rose to a definite peak around 1918, the final year of World War I, and again around 1945, the climax of World War II. Following the World War I peaks the rates in most of these countries declined to a level that represents an approximate extension of the trend before the war. Similarly, after the peaks around 1945, the rates dropped rather sharply until by 1950 they were at or below the approximate level of a projection of the trend between the two wars.

The peaks for France and Belgium came in 1941, and the fairly small peak for Spain, in 1938. These dates are consistent with the trend of the war in those countries. England showed a smaller peak than the other warring countries, with the highest rate occurring in 1941.

In the countries that were at war but were geographically far removed from the areas of intensive fighting (lower right section of chart), the tuberculosis rates did not show any peaks that could be related to the war.

Although Scotland, Northern Ireland, Eire, and Finland (right mid-

dle section of the chart) were neither overrun by enemy forces nor particularly heavily bombed, the rates in these countries showed some increase in the years 1940-44.

In Portugal, Norway, Switzerland, Sweden, and Denmark, some of which were overrun but none of which were heavily bombed (lower left section of chart), there were evidences of retardation in the downward trends of tuberculosis mortality during the war years, but practically no peaks that could be attributed to war conditions.

Infant Mortality

The infant mortality rate is usually considered an index of economic and sanitary status which responds rather readily to environmental conditions. Figure 6 presents data that show particularly the influence of war conditions.

Noting first the two top sections of the chart, it is seen that there was in nearly every one of these countries a peak rate of infant mortality for some year during World War II. In a few countries, such as Austria, there was more or less of a build-up to that peak, but in other countries, there was little increase in the rate until the most intensive year of the war. For example, in the Netherlands there was a minor peak in 1941, but it was small compared with the high peak of 1945. Similarly, in

France there was a peak in 1940, but the peak in 1945 was higher. In both countries the rate declined rapidly in the 5 years following the peak, to a point not far from the projected interwar trend. In England and Wales there was a small rise in 1940 and 1941, but after that time the interwar downward trend continued at a slightly accelerated rate through 1950.

In the countries that were too far from the main theaters of war

to be heavily bombed (lower right chart), no wartime peaks in the infant mortality rates occurred.

The middle right section of the chart includes data for countries that were near the European theater of war, but were not overrun or heavily bombed. Finland had its high peak in infant mortality in 1940 and a smaller peak in 1944. The moderate peaks in Scotland came in 1941 and 1943.

Neutral countries which were in or

near the European theater of war, and some of which were overrun by enemy forces, experienced some moderate peaks in infant mortality. These peaks, however, occurred in the early part of World War II, and in none of these countries is there evidence of any exceptionally high peaks such as occurred in the Netherlands, France, Hungary, and Austria.

There seems to be a tendency toward fewer peaks in the countries

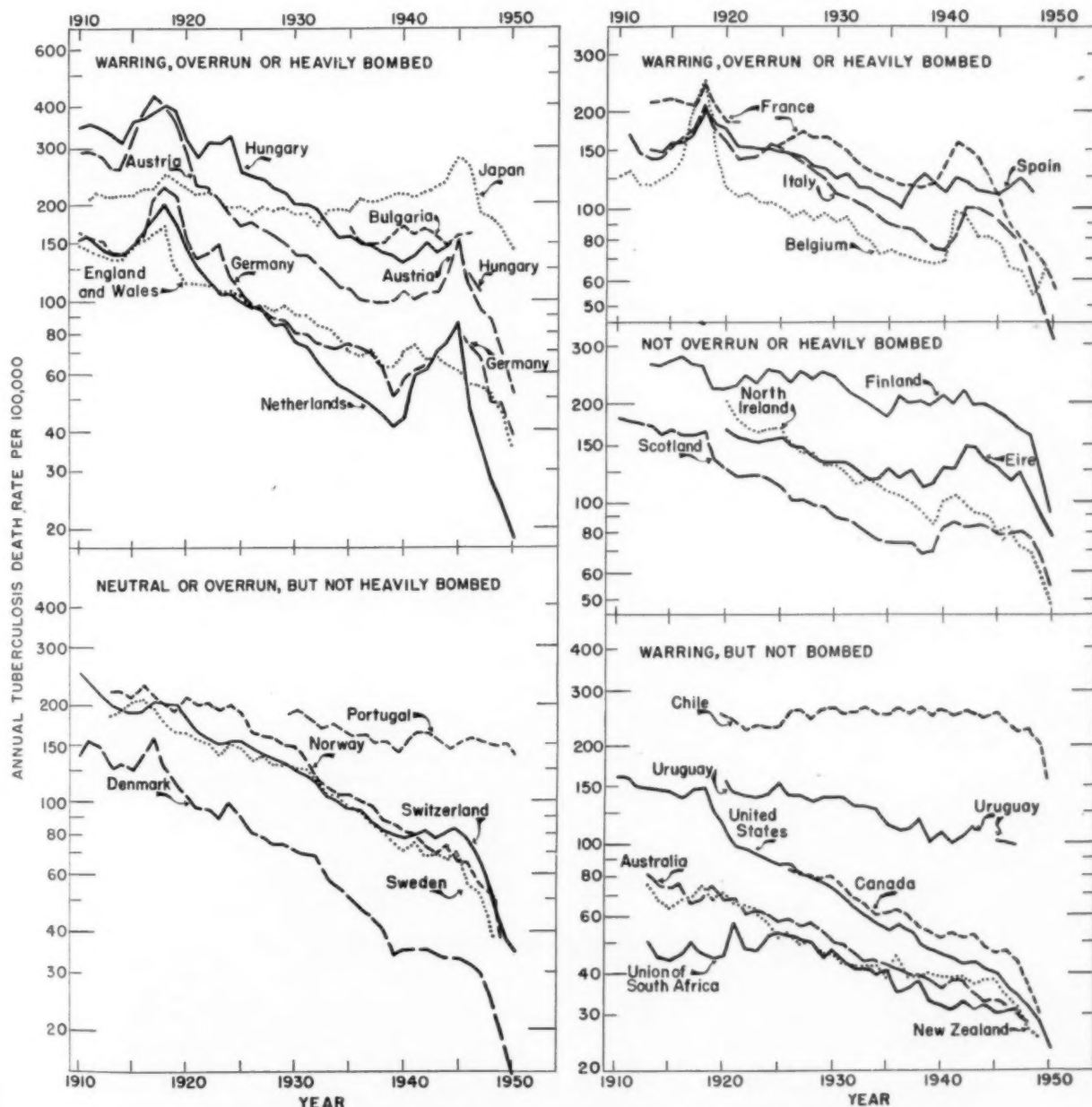


Figure 5. Trend of tuberculosis mortality, 1910-50 (8-10).

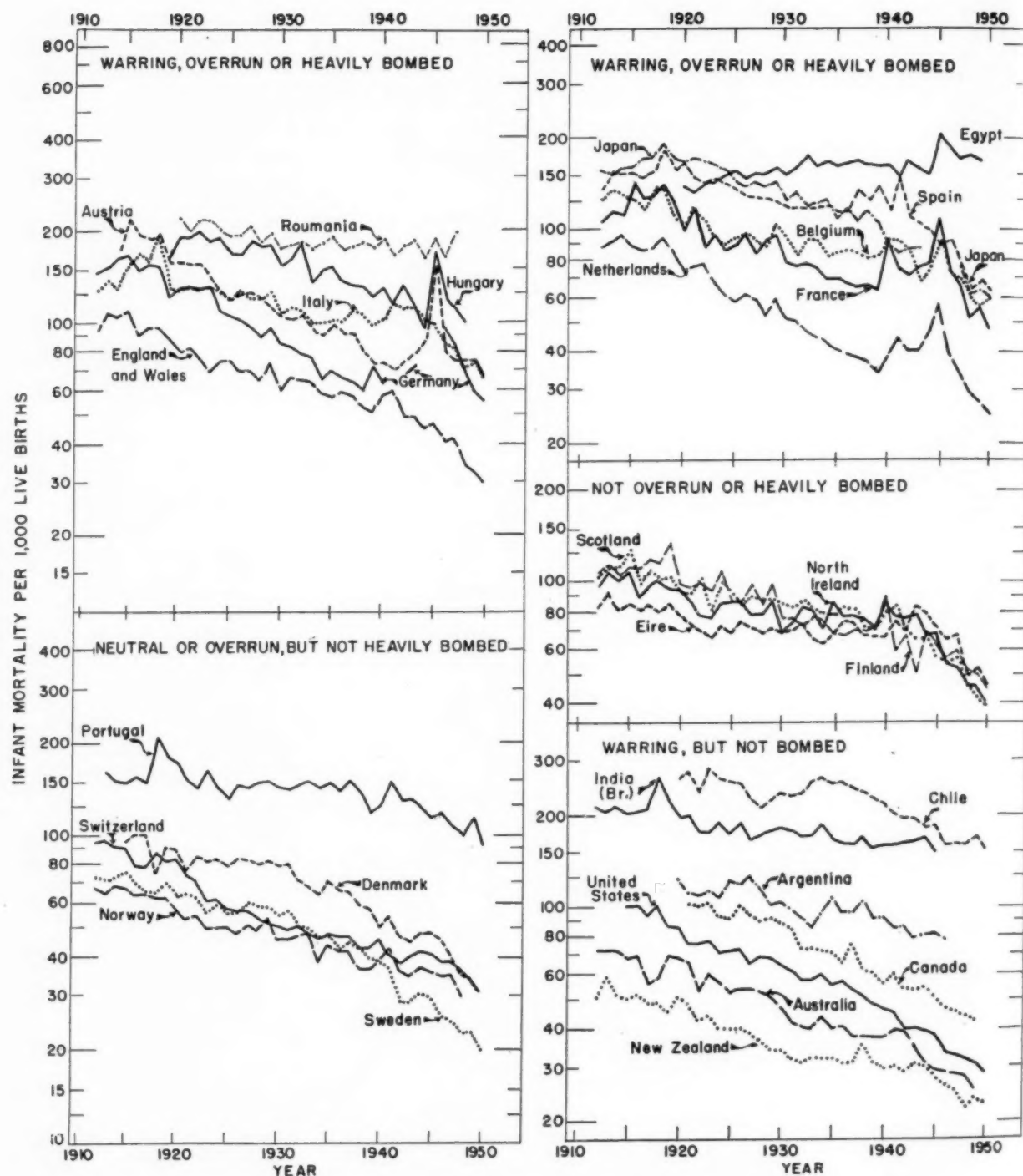


Figure 6. Trend of infant mortality, 1910-50 (8, 11).

where infant mortality is normally very high, such as Roumania, India, and Egypt.

Compared with the trend in tuberculosis mortality, infant mortality had a tendency toward a shorter

build-up to the high wartime peaks and tended to decline in slightly shorter periods to near the prewar level. The build-up in the infant mortality rates was sometimes manifest only in a leveling off of the

prewar trend, but the build-up in tuberculosis tended to be a definite rise in rates for several years preceding the peak.

Tuberculosis is an infectious disease and the patients are usually

sick for several years. In contrast, the sick baby does not count in infant mortality unless he dies within the first 12 months of his life. Since the severe conditions resulting from intensive warfare lasted several years, however, it would be expected that successive cohorts of infants experiencing the same severe conditions would each contribute something to higher death rates. However, nutrition is an important element in infant mortality, and food in many countries must have become more scarce as the intensity of the war was stepped up to its final culmination in 1945, when the highest infant mortality peaks occurred. Another factor of possible importance in saving infants may have been that an increased proportion of them were nursed rather than put on artificial feeding; even without an increase in nursing it may be that in the countries involved mothers normally nursed a high proportion of infants and thus kept infant mortality on a low level until the most severe years of the war.

Summary

Available data on trends of morbidity and mortality have been reviewed. Since 1820, both sickness and death rates in the armed forces have declined, but during wartime peak rates occurred. Data on the trend of illness among male and female industrial workers showed an increase in rates during World War II.

In the absence of data on morbidity from tuberculosis, the trend of mortality was shown. During both world wars there were high

peaks in the tuberculosis mortality rates for most countries at war or overrun by invading armies. Tuberculosis death rates built up in a 3- or 4-year period to high peaks which occurred at the climax of the war but which were followed by sharp declines to rates that represented the approximate levels of extensions of the trend between the two world wars.

Infant mortality showed similar trends except that the rises to peaks tended to occur in shorter periods. In general, war conditions seemed to affect infant mortality somewhat less than tuberculosis mortality.

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Graduates in Sanitary Engineering

The number of graduates from undergraduate courses in sanitary engineering in the United States increased steadily from 1946 to 1950, but declined slightly in 1951. In 1946 there were 36 graduates; in 1947, 120; in 1948, 168; in 1949, 247; in 1950, 287; and in 1951, 244. The number graduated in 1951, however, is well above the average of 172 for the preceding 5-year period, according to the Division of Engineering Resources, Public Health Service.

Dr. Scheele begins second term as Surgeon General of the Public Health Service



Dr. Leonard A. Scheele, Surgeon General of the Public Health Service since 1948, took office for a second term April 6, 1952.

Dr. Scheele is the seventh Surgeon General since the position was created by Congress in 1870. Surgeons General are appointed by the President from the regular commissioned career officers of the Public Health Service for 4-year terms. The Senate confirms their appointments.

A graduate of the University of Michigan (1931) and of Wayne University Medical School (1934), Dr. Scheele was commissioned in the Regular Corps of the Public Health Service on July 10, 1934. From 1934 to 1936 he was given assignments at foreign quarantine stations in San Pedro and San Francisco, Calif., and Honolulu, T. H. In 1936, he was assigned to the Maryland State Health Department for field experience in public health administration, serving as health officer of Queen Anne's County, Md.

In 1937, Dr. Scheele was assigned to the National Cancer Institute for

advanced training in cancer diagnosis, treatment, and research. After 2 years as a fellow at the Memorial Hospital, New York City, he returned to the National Cancer Institute in 1939 as a member of the staff. There he set up and administered the first cancer control program of the Public Health Service. World War II interrupted Dr. Scheele's cancer control work for 4 years. He returned to the National Cancer Institute in 1945 as assistant director and became director in 1947.

Dr. Scheele's wartime assignments began the day after the attack on Pearl Harbor, when he was assigned to the Medical Division of the Office of Civilian Defense. From 1943 to 1945 he was on detail to the medical department of the Army for duty in civil affairs and military government. His major overseas responsibilities were medical, public health, and welfare planning for civilian populations and control of epidemics.

Dr. Scheele served in the Mediterranean Theater of Operations on the 141 Force planning staff of Field

Marshal Lord Harold Alexander. With the Fifteenth Army Group, he participated in the campaigns in Sicily and the mainland of Italy. He also served on the staff of the Allied Control Commission for Italy.

In January 1944, he was transferred to the newly created Supreme Headquarters, Allied Expeditionary Force, London, as a medical member of staff planning for civil affairs and military government in Northwest Europe. He moved to the Continent after D-Day, with headquarters in Versailles and Rheims, France, and Frankfurt, Germany. Later Dr. Scheele served in Berlin as medical consultant for the Potsdam Conference and in the initial operations of the Allied Control Council.

Dr. Scheele was the chief delegate of the United States to the World Health Assembly meetings in 1949, 1950, and 1951, and is serving in that capacity at the Fifth World Health Assembly now meeting in Geneva. He was elected president of the Fourth World Health Assembly, 1951.

Surgeons General of the United States Public Health Service

Terms of Office

John Maynard Woodworth, M.D. <i>April 1871-March 1879</i>	Rupert Blue, M.D. <i>January 1912-January 1920</i>
John B. Hamilton, M.D. <i>April 1879-June 1891</i>	Hugh Smith Cumming, M.D. <i>March 1920-January 1936</i>
Walter Wyman, M.D. <i>June 1891-November 1911</i>	Thomas Parran, M.D. <i>April 1936-April 1948</i>
Leonard A. Scheele, M.D., <i>April 1948-</i>	

Biographical sketches are given in "The U. S. Public Health Service, 1798-1950," by R. C. Williams, Washington, D. C., Commissioned Officers Association of the U. S. Public Health Service, 1951, pp. 472-488.